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THE SCOTTISH GEOGRAPHICAL MAGAZINE

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JOHN HORNE, LL.D., F.R.S., P.R.S.E., HON. EDITOR
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THE SCOTTISH

GEOGRAPHICAL

MAGAZINE.

GREEN HARBOUR, SPITSBERGEN.[1]

By GUNNAR ISACHSEN.

(With Sketch-Map and Illustrations.)

GREEN HARBOUR[2] (Green Bay) runs up in a south-easterly direction on the south side of Ice Fjord, Spitsbergen, at a distance of about 10 km. from the mouth of the fjord. It has waited a long time to be mapped, although this fjord has been one of the most frequently visited in Spitsbergen. In 1891 and 1892, Prince Henry of Bourbon had a rapid sketch[3] of the fjord made from his yacht, the *Fleur de Lys*, and this, in 1899, was inserted in the British Admiralty chart of the anchorages on the west coast of Spitsbergen. The value of this sketch has been indicated by De Geer,[4] who mentions, *inter alia*, that "when trying to identify a glacier which on the sketch of Green Bay von Barry had named after the Princess Aldegonda von Bourbon, born Braganza, I found that the photo, Plate VI. at p. 30, said to represent this glacier, was in reality from Magdalena Bay."

In 1910, Professor G. De Geer's "Geological Map of Central Spitsbergen," scale 1 : 200,000, was published for the Eleventh International Geological Congress, held in Stockholm, and in 1912 his "Map of Central Spitzbergen with the main coal-district," scale 1 : 300,000, was issued. Green Harbour appears on De Geer's maps for the first time as the result of real map-work. While the sketch-map accompanying this article

[1] Translated from the Norwegian by Miss Jessie Muir. We are indebted to the Norwegian Geographical Society, Christiania, for the loan of the blocks of Figs. 1, 2, 3 and 4.—Ed. *S.G.M.*

[2] G. Isachsen: *Green Harbour.* Det norske geografiske Selskabs Aarbok, xxiv., 1912-13, pp. 151-162. Christiania, 1913.

[3] R. Ritter von Barry: *Zwei Fahrten in das nördliche Eismeer nach Spitzbergen und Novaja Zemlja, unternommen von Prinz Heinrich von Bourbon.* Pola, 1894.

was being prepared, I received De Geer's map of 1912, but unfortunately not in time to permit of the adoption throughout of its nomenclature.

In the old whaling days in Spitsbergen, the vessels did not go far up the fjords before anchoring and getting to work, and therefore, as the upper parts of the fjords were of small interest to the whalers, the question of fjord or sound long remained unsolved, a fjord being frequently taken for a sound, and *vice versa*. The name "sound" was given —and still is—to the fjords Bell Sound and Horn Sound, and Foreland Sound was long called Forland Fjord (Voorlands fioerd).

On Barents' map—which was published in 1598 and 1599 by Cornelius Claesz in the second part of the abbreviated Latin edition of Linschoten's *Itinerarium*—Ice Fjord was called *Grooten Inwyck*. This name also occurs on Wright's map (1600) and on Hondius' map (1611). On Daniel's map (1613) the fjord is called *Ysse Sond*, and on that of Caesius (1622), *Ys sond*. On the last-mentioned map, presumably for the first time, Green Harbour is marked as *Groenhaven*. On the Muscovy Company's chart (1625), we find *Ice sounde* and *Greene harboure*; on Middelhouen's chart, No. 2 (1634), *Ys Sondt* and *Green Haven*; on Blaeu's map (about 1662), Ice Fjord is called *Groenhaven*; and on Doncker's (1663) we find *Groene haven*, while Ice Fjord has no name. On Seller's map (1671) we find *Yse Sound* and *Groene Harbour*; on that of Giles and Rep (about 1710), *Ys Sond*, and below the name *Fioord van Groene herberg*. Green Harbour is called *Groene Herberg of Greene Haven*.[1] Zordrager's map (1720) gives *Eys Sond Bay* and *Grüne Herberg*; and Scoresby's (1820) has Green Harbour. De Geer's map (1912) has Green Bay.[2]

It was the English skipper, Jonas Poole, who in 1610 gave the name of Green Haven[3] to the fjord. Poole had been sent out by the Muscovy Company with the *Amitié*, a small vessel of seventy tons, for the purpose of hunting and exploration. On 21st May he was right off Ice Fjord. As ice blocked the fjord, he made a cruise northwards and visited Cross Bay. Bears were plentiful in those days. In Cross Bay, for instance, the party brought down ten bears in one day. On 26th June Poole went into Ice Fjord, and anchored in Green Harbour on the 27th. He did not go out again until the 5th July, when he again sailed northwards to Cross Bay and King's Bay. In the latter fjord Poole found "seacoales which burnt very well." The result of Poole's hunting that summer was 120 walruses, 51 reindeer, 33 bears, and a large quantity of whalebone which was gathered on the shore.

In 1612 a Spanish vessel from San Sebastian took a full cargo of whale in Green Harbour. The vessel was piloted to the harbour by Nicholas Woodcock, who had been to Spitsbergen the year before with a ship from Hull. He was rewarded for his labour in guiding a ship of another nation up to the whaling-ground with sixteen months' imprisonment in the Tower.

In 1613 a large number of vessels were whaling off Spitsbergen, and

[1] G. De Geer: *The Coal Region of Central Spitzbergen.* Ymer, h. 3. Stockholm, 1912.
[2] Norwegian whalers still often call the fjord *Grönherberg.*
[3] M. Conway: *No Man's Land.* Cambridge, 1906.

GREEN HARBOUR

BY

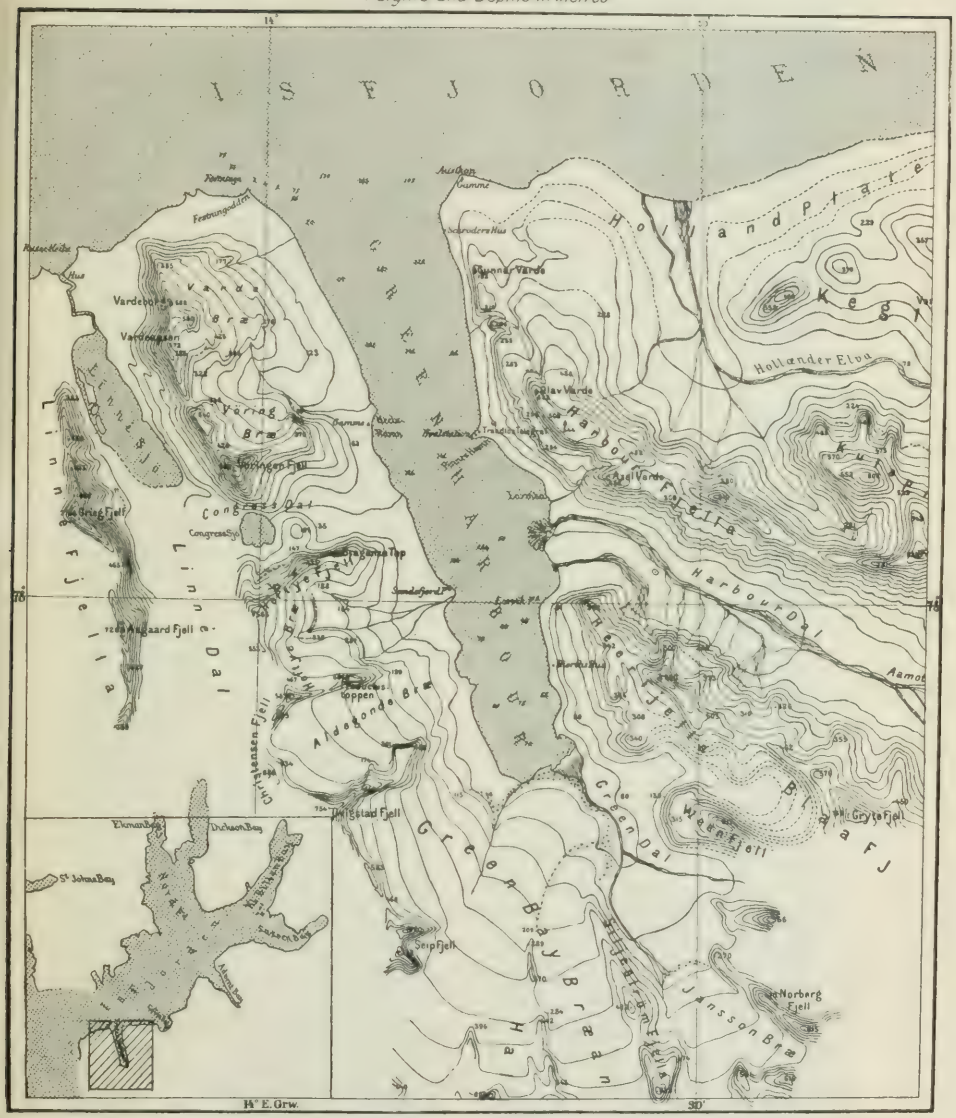
THE ISACHSEN SPITSBERGEN EXPEDITION

1909-1910

1000 500 0 1 2 3 4 5 6 7 8 9 10 km

Contour Interval 50 m

Heights and Depths in metres


I S E F J O R D E N
Holandtare
Holländer Elva
Harbour Fjella
Harbour Dal
Green Bay
Green Dal
Congress Dal
Congress Top
Congress Sjö
Vardecompagnon
Vardecompagnon Fjell
Vardetop
Vardetop Fjell
Vardebrae
Vardebrae Fjell
Elvbrae
Elvbrae Fjell
Elvbrae Dal
Grieg Fjell
Aagaard Fjell
Aldegonde Bræ
Aldegonde Fjell
Aldegonde Top
Christiansen Fjell
Ulfstad Fjell
Seip Fjell
Green Bay Brae
Green Bay Fjell
Wenn Fjell
Gryta Fjell
Norberg Fjell
Jansson Brae
Janssons Fjell
Ekmans Bay
Duchaos Bay
St. Johns Bay
Sawtooth Bay
Mimosa Bay
Hornemans Land
Hornemans Land Fjell
Aamot
Aasi Varde
Svanna Varde
Olav Varde
Kegl
Kegl Fjell
Kegl Brae
Kegl Brae Fjell
Kegl Brae Dal
Kegl Brae Elv

several of them made full cargoes in Green Harbour. Most of the vessels there were English, and they tried to keep other nations away. A French ship, the *Jacques*, of Bordeaux, was, however, allowed to try her luck there on condition that the English had the first eight whales killed by the French ship. The latter killed twelve in all.

Sometimes, however, the Dutch fished in this fjord. In 1616, for instance, a Dutch whaler was in Green Harbour after having fished off Jan Mayen. Ice Fjord was not considered so good a whaling-ground, however, as Bell Sound and Horn Sound; but the ice conditions were better in the former than in the two latter.

Towards the close of the seventeenth century whales had to be sought out at sea, so the bay fishery ceased almost entirely. It was usual, however, at the end of the expedition to put into some Spitsbergen harbour to clean up and to hunt reindeer. Green Harbour was frequently visited for these purposes.

Russians often wintered in Green Harbour in the eighteenth century. In 1826 the Russian Staratschin died in Green Harbour, after having wintered in Spitsbergen for thirty-nine years. Norwegian hunters wintered in Green Harbour in the winter of 1822-23 and the two following winters, their number in the two last years being twenty-two. There was both a Russian and a Norwegian hut.[1]

On entering Ice Fjord from the south, we see Mount Grieg (778 m.) on the south side of the fjord, and behind it a similar mountain, Mount Vardeborg (588 m.). Both slope evenly down on the north side towards the coast plain which, to the north and west of the Linné Mountains, is over 3 km. wide, while to the north and east of Mount Vardeborg its width is only from 1 to 2 kilometres.

Between the two above-mentioned mountains runs the Linné Valley in a southerly direction, about 2 km. in width; and at its upper end lies the Linné Glacier. The north part of the valley is occupied by Lake Linné, which is about 5 km. in length and about 1 km. wide. A river runs from the north end of the lake out into Russe Keila.

In turning from mid-channel in Green Harbour and going up the fjord, one notices several glaciers on the west side and at the head of the fjord, whereas there are none visible on the east side. At the extreme north is Varde Glacier, which ends at an altitude of about 150 m. To the south, north of Mount Vöringen (668 m.), lies the Vöring Glacier, which terminates at an altitude of about 100 m. The stream from the first of these glaciers runs into Green Harbour a couple of kilometres to the south of Festningen Island, while that from the second glacier mentioned runs out at Point Hecla.

South of Mount Vöringen runs Congress Valley at a height of about 100 m., from Green Harbour to Linné Valley. At about its highest point is Congress Lake, which is almost circular, and measures about 1 km. across. The lake's outlet is towards the east, its water flowing into Green Harbour on the north side of the promontory lying southwest of sounding 114.

[1] B. M. Keilhau: *Reise i Øst- og Vest-Finmarken samt til Beeren Eiland og Spitsbergen i Aarene* 1827 *og* 1828. Christiania, 1831.

Figs. 1 and 2.—The lower end of Green Harbour and Ice Fiord, seen from Gunnar Cairn (Gunnar Varde). *Phot. Aug. 1909.*

To the south of Congress Valley stands Mount Heftye (372 to 553 m.), with Heftye Glacier descending on its south and east sides, the north branch ending at a height of about 200 m., the south at about 150 m. The streams from these glaciers unite and fall into Green Harbour at Sandefjord Point.

On the south and east of Mount Christensen, 563 to 686 m., Aldegonde Glacier descends right into Green Harbour, 1 to 2 km. to the south of Sandefjord Point.

The name of Green Bay Glacier has been given to the three or four glaciers that converge towards the head of Green Harbour. The western and northern branches, between the mountains Quigstad (754 m.) and Seip (728 m.), end at a height of about 50 m., while the middle branch between Mount Seip and the Halland Mountains goes almost down to the sea. The lower part of this branch turns in a north-easterly direction towards Green Valley. The most easterly and southerly of these great glacier arms descend between the Halland and the Siljeström Mountains, and terminates, together with the middle branch, in Green Valley. The streams from the two last-mentioned branches unite with that from the Jansson Glacier farther east, and fall into the upper end of Green Harbour.

On the east side of the fjord the cliffs rise evenly in small terraces southwards from the mouth as far as east of Finnes Harbour, where the flat-topped Harbour Mountain rises abruptly from about 300 m. to almost double that height. The Harbour Mountains run in a south-easterly direction on the north side of Harbour Valley, a valley from 2 to 3 km. in width, through which flows the Harbour River with its numerous tributaries and branches.

On the south side of Harbour Valley are the Heer Mountains, running south-east from Larvik Point in two terraces (352 m. and 640 m.), then sinking, inland, to the north of Mount Ween, to rise once more in Gryte Mountain (758 m.). To the east of the last-named mountain, and separated from it by Skar Valley, stands Skavl Mountain (700 to 848 m.), on whose north side the Tunge Glacier descends in two tongues to within 200 m. of sea-level.

To the east of the Harbour Mountains, between two branches of the Hollænder River, are the Kulspids Mountains with Mount Fossil (825 m.).

To the north of these mountains and west of Laila Valley, which runs down to Coles Bay, lie the Kegle Mountains, with their conspicuous summits, Vestal (658 m.), Vesuv (742 m.), Nox (801 m.), and Vesle Keglefyell (806 m.). To the south of the last-named mountain, at the south-east end of the Kulspids Mountains, stands the highest hill within the area mapped—Mount Björnson (926 m.).

East of Laila Valley, lying north and south, is Mount Holmsen, which on the south rises to an altitude of 686 m., and on the north descends abruptly from the Altar, a flat terrace 350 m. above sea-level, down to the delta in Coles Bay.

On the east side of Mount Holmsen is Coles Valley, running in an east-south-easterly direction.

Very nearly all the glaciers are situated, as will be seen from the map, on the east of Green Harbour, on the northern and eastern slopes of the mountains drained by the Harbour, Hollænder, and Laila Rivers.

From Mijen Bay in Bell Sound there is a pass to Green Harbour unimpeded by ice, through the Conway, Pas, and Harbour Valleys. While there was no ice on the watershed here, which lies at a height of about 200 m. above the sea, on August 5, 1909, there were huge snowdrifts lying on the somewhat higher watershed between Skar Valley and Berzelius Valley on August 14, 1909; but these may possibly disappear in a good summer.[1] From Conway Valley in Mijen Bay there are several valleys more or less free from ice running across to Coles Bay. These valleys have often been traversed by Norwegians on hunting expeditions, or, when ice conditions were bad in the autumn, in crossing to Ice Fjord, which as a rule is open longer than Bell Sound.

Among the glaciers forming a continuous glacier-covering between Green Harbour and Bell Sound (Mijen Bay) may be mentioned the central branch of the Green Bay Glacier and Erdmann Glacier, which terminates a few kilometres north of Muyden Haven in Bell Sound. From sea to sea there is a very good glacier-crossing over the Green Bay and Frithjof Glaciers to Mijen Bay due north of Axel Island. This

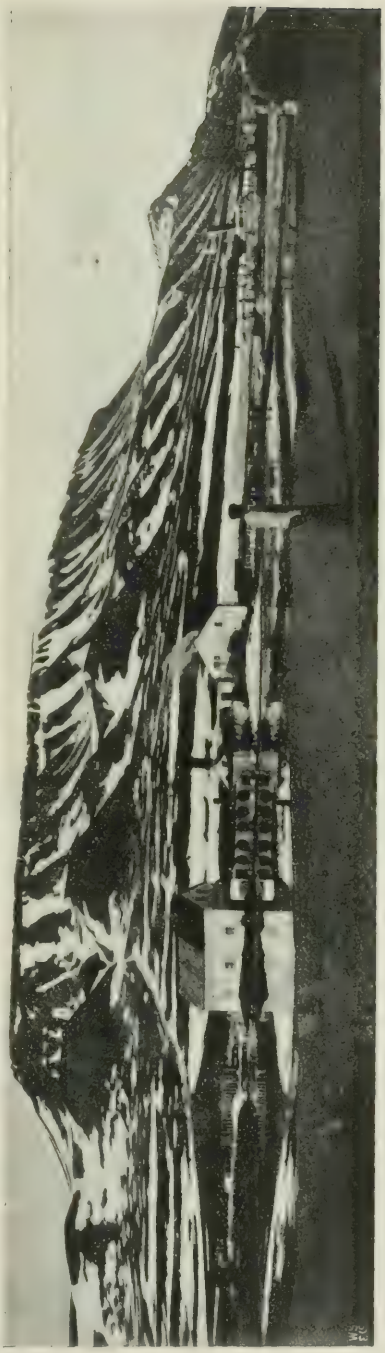
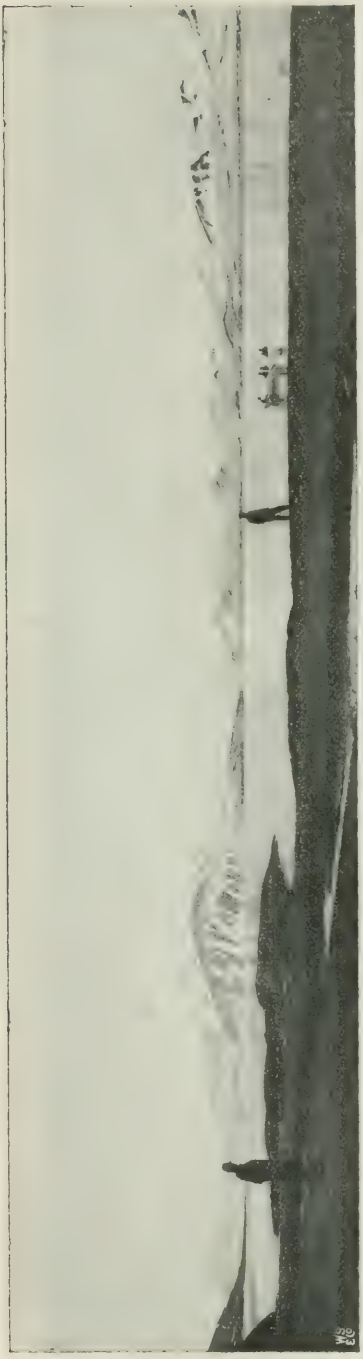


Fig. 3.—Station at Cape Finnes with Harbour Mountain behind.

[1] G. Holmsen: *Beretning om en geologisk expedition til Spitsbergen*, 1909. Bergens Museums Aarbok, 1911, No. 9.



Phot. July 1910.

FIG. 4.—View from Cape Finnes.

passage was made two or three times during Isachsen's expedition in 1910 in six hours. The two glaciers mentioned were free from crevasses and easy to cross. The divide, between the Marcussen and Vasskil Mountains, lies at an altitude of about 400 m. As in this, the shortest and easiest glacier-crossing between Bell Sound and Ice Fjord, there is not the same probability of meeting with game as in the ice-free valleys east of it, it is natural that hunters should not have taken the glacier-crossing, but preferred to keep to the longer way over the bare land to the east.

According to Holtedahl,[1] the land to the east of Green Harbour consists of coal-bearing Tertiary sandstone lying in almost horizontal layers. There are also Tertiary beds on the west side in the area farthest north along the coast, while the greater part of the districts nearest the coast consist of slate and sandstone, here and there fossiliferous, belonging to the Jura and Triassic formations. The high chain of mountains in the west consists of beds of flints and limestone of Carboniferous age. On the west side the dip is always steep towards the east. The margin of low-lying land surrounding the coast in Green Harbour and elsewhere is generally not very broad nor especially level. On the west side there are large gravelly terraces upon the flat. In many

[1] G. Isachsen: *The Hydrographic Observations of the Isachsen Spitsbergen Expedition*, 1909-10, Kristiania, 1912; and O. Holtedahl: *Zur Kenntnis der Karbonablagerungen des westlichen Spitzbergens*, II., Kristiania, 1913.

places the mountains have a rather precipitous slope towards the sea. The greater part of the fjord-coast bears cliffs, generally not many metres in height; and it is only at projecting points and at the head of the fjord, in front of the huge moraine heaps deposited by the great glacier, that an even sandy shore is found. In the delta at the mouth of the river in Harbour Valley, south of Axel Cairn, and in that of the river to the east of Green Bay Glacier, the water over this sand or mud beach is shallow for a very long way out. The outermost part of Finnes consists of sandbanks piled up by tidal currents. A lagoon is enclosed within these sandbanks.

Green Harbour is 17 km. long, 5 km. broad at the mouth, and 2 km. at the head. The fjord has a straight course, and diminishes evenly in width from mouth to head, except for the inlet Larvika, in the middle of the east side, which is 3.5 km. broad and about 1 km. deep, and for two or three smaller bays nearer the head on the same side. On the west side of the fjord there is a slight indentation, Hecla Harbour, and a couple of bays nearer the head to the south of Sandefjord Point.

The middle, inner part of the fjord[1] has a depth of about 78 m., with a low bar at a depth of nearly 60 m. between Larvik Point and Aldegonde Glacier. North of this and almost up to the mouth is the deepest part of the fjord, 141 m., terminating in a low bar at a depth

Fig. 5.—Cape Finnes Harbour.

[1] *The Hydrographic Observations of the Isachsen Spitsbergen Expedition*, 1909-10. Kristiania, 1912.

of 127 m., west of Gunnar Cairn. From this bar the bottom sinks evenly outwards to a depth of 165 m. in the middle, at the mouth of the fjord, and continues outwards into the deep water of Ice Fjord. Apart from the deep channel in the middle of the fjord, the greatest depths to the south of and within the last-mentioned bar are along the west shore, while north of it they are nearest the east shore. The fairway outside Cape Festningen, east of the little island of the same name, is foul, and vessels should therefore take the middle of the fjord before turning in. In any case they should not come within one kilometre of the island. East of Festningen Island on the map, three soundings are marked, 2, 4, and 28. The last of these is incorrect: it should be 8.

Hecla Harbour lies on the west side of the fjord, 7 km. from its mouth. The anchor may well be dropped off the hut, which is easy to discern on nearing the anchorage. There is good holding ground of clay. It is also possible to anchor on the north side of Point Hecla, off which, as also off Cape Finnes on the east side, the depths are considerably greater than at the sides of the promontory. Water may be taken from the river there. Hecla Harbour is the station of the Norwegian Whaling Company, "Alfa & Beta," of Sandefjord.

Finnes Harbour is on the east side of the fjord, 8 km. from the mouth. There is anchorage both north and south of the cape. If there is much drift-ice in the fjord, the anchorage is uncertain, as the tide runs strong. There is good holding-ground, clay and mud. On the south side of the headland lies the station of the Norwegian Whaling Company "Nimrod," of Larvik. Water may be obtained from the whaling-station's pipes. At a distance of 300 m. from the station is the Norwegian wireless station.

Most of the Norwegian interests and business in Spitsbergen are centred in and around Green Harbour, these interests being in connection with coal-fields, whaling, fishing, hunting, tourist traffic, and the Norwegian wireless and postal stations.

Coal-fields.[1]

The first claims on coal-fields in Green Harbour by Norwegians were made in 1900. Among companies formed on these and subsequent claims may be mentioned Kulkompagniet Isefjord, Det norske Spitsbergen Kulkompagni, A S Kulspids, the Norwegian Green Harbour Coal Co., etc. Americans have also claimed land in Green Harbour (Ayer & Longyear). As many of these claims overlap one another, disputes have arisen, both between Norwegian companies, and between them and the American company. Negotiations between the various companies have been carried on of late years, and are still going on, for the purpose of arriving at a reasonable solution of the difficulties.

[1] See also Dr. Rudmose Brown's article in vol. xxviii., p. 561.—Ed. *S.G.M.*

For export, the value of the coal is dependent upon a number of factors, such as the supply of coal from other places and the cost of production. A report by Mr. W. H. Hunt, American consul at St. Etienne, France, is interesting in this respect. He says: "The cost of coal production in France is greater than in any other country in Europe, with the possible exception of Belgium, and it is steadily increasing, as will be seen from the following statement showing the price per ton of coal at the mines in the several countries in 1886, 1907 and 1909:—

Countries.	1886.	1907.	1909.
Belgium,	$1.59	$3.28	$3.11
France,	2.14	2.90	3.08
Germany (in Westphalia),	0.96	2.15	2.45
Russia,	...	...	2.49
Spain,	...	...	2.44
England,	1.19	2.05	2.13
Wales,	1.36	2.84	...
Austria-Hungary,	...	...	2.11

"Many reasons are advanced to explain the increasing high cost of coal production, among which the following may be mentioned. The annual output has been falling off for a number of years, in spite of the introduction of modern machinery, as the following statement showing the yearly output per miner proves:—

Countries.	1899.	1908.
England,	311 tons	279 tons
Germany,	264 „	246 „
France,	211 „	189 „
Belgium,	173 „	160 „

"The wages of the miners during the same period have steadily increased."

If the value of coal worked in a temperate climate depends upon a series of factors, much more is this the case in an Arctic one. Thus the export of coals from Spitsbergen will as a rule be possible only during about four months in the year, from June to September. The extraction, however, can be carried on during the whole year, and probably more cheaply than in Europe, as no pumping nor shoring up with timber requires to be done, the coal being found from sea-level to a height up to and above 200 metres. Wages will probably remain higher in Spitsbergen than in Europe. The greatest difficulty in connection with coal-mining in Spitsbergen, however, is that the land is not administered by any power, but is a No Man's Land.

TABLE OF THE WHALING WITH NORWEGIAN WHALERS AT SPITSBERGEN AND BEAR ISLAND.[1]

The figures for the years 1905-1910 are taken from the official Norwegian statistics, to which a few additions have been made; those for 1911 and 1912 were kindly furnished by the late Auders Marcussen, a whaler of Sandefjord (the Nimrod Co., Green Harbour).

Year.	Number of Companies.	Number of Boats.	Number of Whales.	Number of Barrels of Oil.	Average Number of Barrels of Oil per Boat.	Bottlenose Whales.	Remarks.
1905	8	16	599	18,660	1,166	...	The catch was considerable, notwithstanding somewhat unfortunate ice conditions; but the expenses were great.
1906	7	14	315	11,195	785	...	The catch was much smaller than the year before, whales being scarce, and whaling hindered by storm and still more by fog.
1907	7	15	333	9,345	628	16	The catch considerably smaller than the year before, the reason probably being the unusually difficult ice conditions.
1908	5	11	Of the 5 companies, 3 took 124 whales. No particulars of the other 2 companies.	4,410	...	9	The catch was less than previous years, and the figures show a steady decrease.
1909	2	6	114	4,300	717	...	Occurrence of whale about as previous years. The smaller number of vessels and the more favourable weather probably accounted for the somewhat better results.
1910	2	6	165	5,400[2]	900	...	Whales were scarce, but occurred rather more regularly than in preceding years. Ice caused some interruptions in the whaling.
1911	2	6	144	5,613	936	...	Quantity of whales much as year before. During the first third of the season, hindered by ice.
1912	2	6	55	2,200	366	...	Some finbacks occurred very occasionally, hardly any blue whales. Whaling hindered by rough weather and fog.

Whaler A. Marcussen wrote in April 1913: "It is not easy now to obtain particulars of what the 2 missing companies caught. I remember, however, that one company, Giæver, from Tromsö, with two boats and the boilery *Bucentaur*, got 8 whales that year (1908). The complete failure of the whaling off Spitsbergen last year (1912) was due, I think, to a great extent to the current conditions, which were very different from previous years."

[1] The statistics for the years 1905-1908 give Spitsbergen and Bear Island as the whaling ground; and for 1909-1910, Spitsbergen.

[2] In the statistics for the years 1905-1909 the figures in this column represent the number of barrels of *whale oil* (tran); for 1910, barrels of *oil* (olje).

Whaling and Fishing.

Since 1901 several claims have been made in Green Harbour from which to carry on whaling. Among these may be mentioned the land round Hecla Harbour, Finnes Harbour, and Russe Keila, the last-named for salmon-fishing (*Salmo alpinus*).

Of the companies that up to 1905 were carrying on whaling along the shores of Northern Norway, two were dissolved, one went to the Färoe Isles, one to Bear Island, and eight to Spitsbergen. Seven of these eight companies had a floating boilery, and one a station on shore, at Finnes Harbour. The stations in Spitsbergen were in Horn Sound, Bell Sound, and Ice Fjord (Green Harbour and Safe Haven). One company was whaling from Bear Island from 1905 to 1908, with a land station in Walrus Harbour. The catches of the Norwegian whalers for the years 1905-1912, both inclusive, are shown on the table opposite.

As the whaling off Spitsbergen has not been very remunerative, the number of companies has gradually diminished, and the companies have gone to other richer fields, especially in the south. Thus from 1909 to 1912 only two companies have carried on whaling from stations in Spitsbergen. After the bad results in 1912 these companies did not fish there in 1913 and 1914. The company on Bear Island had also been so unsuccessful that they gave it up as early as 1908. The station is still standing, however, in Walrus Harbour.

As the companies began work as early as May or June, they were often hindered by the ice both at Spitsbergen and at Bear Island. One great difficulty in the latter locality was the bad harbour accommodation, with constant breaking of often heavy surf.

No figures can be given regarding the results of the salmon-fishing in Green Harbour, but they cannot have amounted to very many barrels per annum. It was especially the people of the whaling-station who carried on the fishing, as it afforded a welcome change in their fare.

In the seventies and eighties of last century cod was also fished off the coasts of Spitsbergen, but this is no longer done.

Hunting.

Round Green Harbour the stock of game is now so small that no one would think of settling down there for the winter hunting alone. Foxes there must still be, and a bear may be seen in Green Harbour in the course of the winter; but the only chance of seeing reindeer at all is by going far up the valleys. As long as it was only shot and trapped, the game lived under more or less reasonable conditions; but the use of poison has been very destructive. This reprehensible custom is all the more to be deplored from the fact that no small percentage of the animals thus killed are lost, because they creep into hiding, and die without being found. I have also heard hunters say that they have not only seen gulls die from feeding on the carcases of bears and foxes killed with strychnine, but also reindeer from eating the grass round the spot

on which the poisoned carcase had lain. Killing by poison is now forbidden by the Norwegian Government.

It is only within the last ten years that wintering in Spitsbergen for hunting has become general. Formerly—ever since 1821—hunting expeditions to Spitsbergen were carried on with small old ships from March until well into the autumn. There are now, as stated above, few whaling vessels at Spitsbergen, which, however, is visited, as a rule, by sealers for the purpose of hunting smaller game, when they cross from the western ice to the eastern. This hunting in Spitsbergen—seal, reindeer, and the collecting of down and eggs—is rather more general than before. Sleeper-sharks, which are now scarcely ever fished for, were formerly also often caught. The beluga was caught—from the sixties to the nineties of last century—in the fjords and bays of Spitsbergen, Ice Fjord, Bell Sound, and Magdalena Bay; but now it is only occasionally hunted.

The value of the Norwegian hunting and fishing in the polar regions during the period from 1892 to 1911 is as follows:—

Year.	Kr.	Year.	Kr.
1892,	316,773	1902,	458,060
1893,	246,038	1903,	469,765
1894,	228,730	1904,	311,191
1895,	222,099	1905,	490,000
1896,	319,407	1906,	415,000
1897,	368,849	1907,	618,270
1898,	355,479	1908,	570,743
1899,	208,467	1909,	842,132
1900,	287,720	1910,	893,020
1901,	272,679	1911,	678,492

In these figures, which are taken from the Introduction to the Fishery Statistics (*Norges Fiskerier, Aarsberetning vedkommende Norges Fiskerier*), published by the Director of Fisheries in Bergen, the proceeds of the wintering expeditions are included. They are taken from *Norsk Fiskeritidende* (Bergen), where more detailed information will be found.

Many lives have been lost in the wintering expeditions, chiefly as a result of deficient equipment. The Norwegian Government has therefore been considering the institution of public control of the vessels, equipment, etc., employed in these expeditions.

During the last year or two such expeditions have become far less numerous. The yield has been too small. It is therefore to be hoped that the stock of game will increase. Tourists have also maltreated the reindeer in Spitsbergen, especially round Ice Fjord, often shooting the animals without making use of them afterwards.

Tourist Traffic.

Green Harbour is frequently visited by tourist steamers in the summer. Formerly the vessels used always to go to Advent Bay, which is now often omitted from the tour; but most of the tourist steamers, at any rate the Norwegian boats, go into Green Harbour. It is true

that the coal-mining in Advent Bay is at a more advanced stage; but the whaling station in Green Harbour is no less interesting. Every summer a steamer of each of the Norwegian companies, the Bergenske, Nordenfjeldske, and Vesteraalen, goes there. In 1913, for instance, on the 8th August, the first two companies' ships, *Vega* and *Kong Harald*, left Odda, in Hardanger, where they were joined by travellers from Newcastle, Antwerp, and Hamburg. On their way north the vessels called at Bergen, Geiranger, Trondhjem, Raftsund, Troldfjord, Digermulen, Tromsö, Hammerfest, and the North Cape, which last they left on 16th August. Spitsbergen was reached on 18th August, and Coles Bay, Advent Bay, Green Harbour, Virgo Bay, Cross Bay, Möller Bay, and Lilliehöök Bay were called at. The last three places are rightly considered the crowning beauties of the tour. The Norwegian tourist

Phot. Aug. 1910.

FIG. 6.—Looking southwards from the watershed over the Frithjof Glacier to Mijen Bay.

ships were the first to include these places in their route, and began to do so in 1908. From Virgo Bay the ships go to the pack-ice, and then run southwards along the west coast of Spitsbergen into Bell Sound and to Bear Island if the weather permits, returning to Hammerfest on the fifth day after the arrival in Spitsbergen. A week later, after calling at Lyngseidet, Tromsö, Lofoten, Torghatten, Trondhjem, Næs in Romsdal, Molde, Flaam, and Gudvangen, the ships reach Bergen, where the tour ends. In addition to the Norwegian companies, the Norddeutscher Lloyd of Bremen generally sends one of its vessels on a tour to Spitsbergen. Of late years it has been the *Grosser Kurfürst*. Several other vessels are also frequent visitors to Spitsbergen, and every now and then a steam-yacht makes the tour to the islands.

The descriptive bills hold out prospects of seal, bear, and reindeer-shooting, but as a rule the shooting is now confined to sea-birds. The

tours with the Norwegian ships are in great favour, largely on account of the safety that is ensured by the ships of the two companies going together. The stay made at the various places called at is very brief, indeed far too brief. Opportunity should be given to those who might desire to make excursions on shore, and thus acquire a more complete impression of Spitsbergen. There is one such excursion in particular, which has often been recommended, and which would be arranged without any loss of time for the steamer. This is the excursion from Bell Sound to Green Harbour. The steamers call at both places, and those who might like to go overland would arrive at their destination quite as soon as the ship. They might be landed on the west side of the Frithjof Glacier in Bell Sound, taking ski, snow-spectacles, and provisions for one or two days. The ship would then sail to Green

Phot. Aug. 1910.

FIG. 7.—Looking northwards from the watershed over Green Bay Glacier to Green Harbour.

Harbour, and the pedestrians go north up the Frithjof Glacier, which is as level as a road and has no crevasses. From the watershed (400 m. above the sea) there is a wonderful view of the typical inland scenery of an arctic land (see Figs. 6 and 7). The descent is over the Green Bay Glacier, which is also free from crevasses and easy to walk on. A large moraine separates the glacier from the head of Green Harbour, where one of the ship's motor-boats might pick up the pedestrians. The whole excursion may be done in six hours, and there is little risk connected with it, even if bad weather should occur. The ascent of one of the inland mountains might be included in the excursion.

The scenery round Green Harbour is more interesting than that of Advent Bay, as it not only presents the same formations as the latter, but also wilder scenery on the west side of the fjord, interspersed with glaciers, and the great ice-covered region in the south.

Buildings.

There are several houses and huts round Green Harbour. The Norske Spitsbergen Kulkompagni has barracks on Larvik Point (not marked on the map) and storehouses 1½ km. farther south (Hiorth's House). Green Harbour Coal Co. has erected a house (not on the map) to the south-east of the whaling-station on Finnes, and the American company (Arctic Coal Co.) has two houses (Longyear Villa) a little to the north of this again. Near the mouth of the fjord, the Kulkompagni Isefjord has a house (Schröder's House), and at Aust Kap (Cape Heer) there is a hut that has been erected by hunters passing the winter there.

On the west side, in Hecla Harbour, hunters from Tromsö have put up a hut, and at Russe Keila the Nimrod Whaling Company has erected a house on the west side of the river that flows from Lake Linné. (On the map the house is incorrectly marked on the east side of the river.) The largest number of houses is found on the promontory by Finnes Harbour, where the whaling-station and the Norwegian wireless station stand side by side. The position of the houses can be seen on the Nimrod Company's map (Fig. 8), which was kindly lent to me.

The whaling-station's houses are (1) the men's barracks, (2) the manager's house and kitchen, (3) the bakery, (4) the drying-house and mill for guano, (5) the flesh-boiling house, (6) the flensing floor, (7) bait, (8) boiler-house, (9) blubber-room, (10) blubber-boiling house, and (11) smithy. The wireless-station's houses are (*a*) employés' barracks, (*b*) temporary work-barracks (now storehouse), (*c*) flagstaff, (*d*) petroleum house, (*e*) coal and wood, (*f*) station-building, (*g*) backstays, (*h*) oil-house.

The desirability of building a church in Spitsbergen has been expressed in the Norwegian daily papers. If this were done, it would probably be erected either in Green Harbour or in Advent Bay.

In this connection there is some interest in the papal decree that was signed on June 1, 1913, by Cardinal Gotti, Prefect in the "Sacred Congregation for the spread of the truth," and which shows that the Roman Catholics too will not be behindhand in extending their propaganda to Spitsbergen.

"The northerly-situated islands forming the group generally called Spitsbergen, though formerly uninhabited and even considered uninhabitable, have of late years begun to be visited regularly by many people from many countries, especially Russia, Denmark, Sweden, and above all from Norway, who come either as tourists or to carry on fishing or hunting there, or to extract the minerals that are found in many places in these islands: indeed there are not a few who have taken up their abode on these islands with their families. In order that the spiritual needs of the Catholics visiting or settled there may be in some degree cared for, and in order that the gospel may also be preached in all these remote districts, the most reverend members of the Sacred Congregation for the spread of Christianity have discussed at their meeting of the 26th May of the present year what the Very Reverend J. B. O. Fallize, the Vicar Apostolic in Norway, has recently put before

this Sacred Congregation concerning the religious, as also the political and economical, conditions of those regions.

"After mature consideration of all these conditions, and with regard

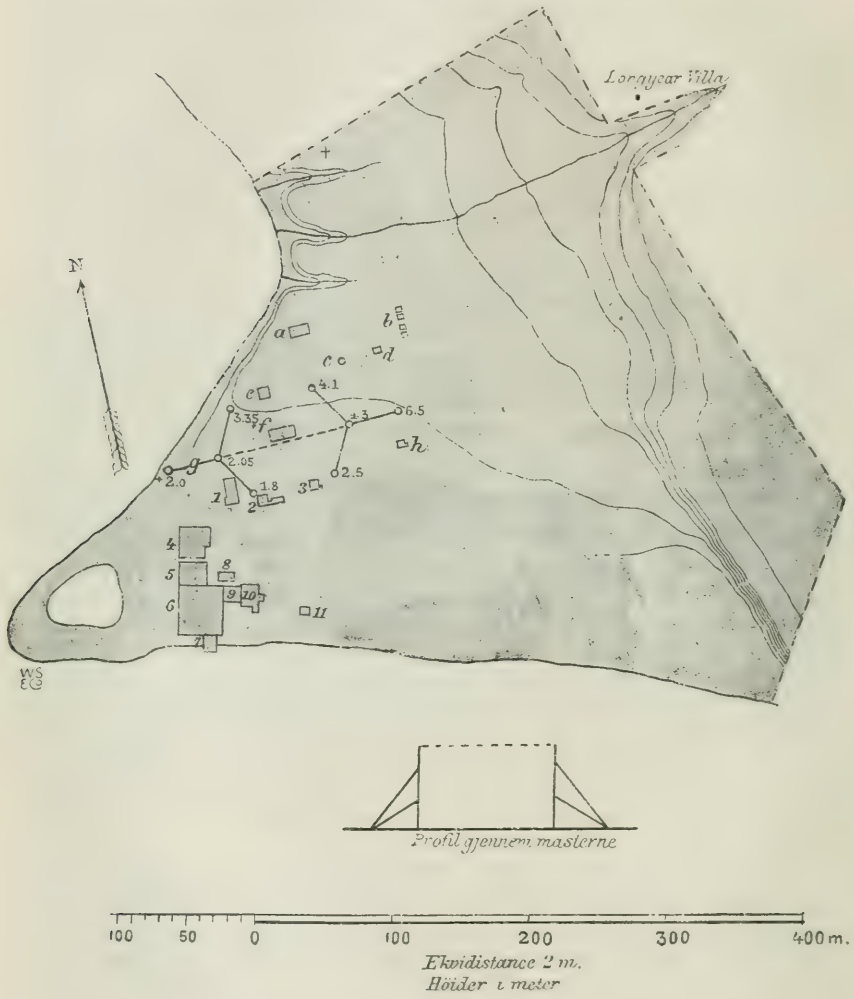


FIG. 8.—Sketch-map of the settlement at Cape Finnes.
The heights are in metres and the contour distance is 2 metres.

to what the above-named Vicar Apostolic in Norway, and the Very Reverend Albert Bitter, the Vicar Apostolic in Sweden, have proposed to this Sacred Congregation, the fathers of the Congregation have intimated their desire that the group of islands called Spitsbergen shall be combined with the apostolic vicariate of Norway, so as to form an integral

part of one vicariate, which shall now be called the 'Vicariate of Norway and Spitsbergen.'

"This proposal of the very reverend fathers was put before His Holiness Pope Pius X. in an audience of the 26th of the same month, by the undersigned Secretary of the Sacred Congregation, and in every particular approved and confirmed by His Holiness, who commanded that the present decree concerning this matter should be drawn up."

The Norwegian Wireless Station.

The material for this station was ordered from the Gesellschaft für drahtlose Telegraphie, the Telefunken system, through that company's representative, the electric company A. E. G. in Christiania. The buildings were ordered from the Strömmen wood-goods factory, Norway. The erection of the station was entrusted to engineer Hermod Peterson, to whom I am indebted for the following particulars. Owing to the difficult climatic conditions in Spitsbergen, allowance had to be made for a building period of about ten weeks at most; and as the object of this station was to connect Spitsbergen with the telegraphic system via Ingö radio, which is about 900 kilometres distant from the site of the intended station in Spitsbergen, the latter had to be comparatively large according to existing wireless conditions, namely, a so-called 5 T. K. station, whereby an oscillation energy of 5 kilowatts can be produced in the antenna. The normal time for the erection of such a station was at that time about eight months. Another circumstance to be taken into account was that nothing could be obtained on the spot, so that all necessary material had to be conveyed thither. The telegraphic department hired the steamship *Fanny* (about 600 tons), of Arendal, for the transportation of all the material to the station. As allowance had to be made for two full cargoes, the materials had to be sent to Christiania for the loading of the first cargo, and to Tromsö for that of the second cargo. After overcoming several difficulties, the *Fanny* reached Green Harbour on her first voyage on the 9th July 1911. Fire broke out on board on the way north, and some materials and provisions were thrown overboard or destroyed, but fortunately no great harm was done. A site for the station was chosen on the promontory on which the whaling establishment "Nimrod," of Larvik, stands. The work of building was begun on the 11th July, and on the 20th September, after rather more than two months, the station was in working order. The number of workmen employed varied, the maximum being forty-five, in addition to fitters and the station employés. The telegraphic department furnished their board. The total of hours of labour was about 27,000, and the average payment per hour was 75 öre. The workmen also had their travelling expenses paid both ways, with board. Only Norwegian labour was employed. The engineer of the works says that the shortness of the time taken in the building was due in the first place to the excellent body of workmen, who regarded the undertaking as a national one, each man taking a pride in contributing to the best of his ability towards the completion

of the work before the ice shut them off from the rest of the world. There was much overtime work done. Under difficult conditions the work was done in day and night shifts. Some of the men had an average working day of thirteen hours. On the 15th September half the detachment was sent home by s.s. *Locksley*, and the other half on the 20th by the motor-smack *Hella*.

The Norwegian wireless station at Ingö, near Hammerfest, was temporarily completed on November 23, 1911, and on that night the first telegrams were exchanged. The line from Spitsbergen to Ingö was opened for public messages on December 10, 1911, and since that date has worked excellently in every respect. The receipts for telegrams sent by the Spitsbergen radio from December 10, 1911, to June 30, 1912, were about 7,362 kr.; and in the following year—up to June 30, 1913—more than 18,000 kr.

The Norwegian Postal Station.

When the Norwegian whalers, in 1905, began whaling with Spitsbergen as their base, the post to Norway was dispatched from one of the whaling-stations in Bell Sound. When some of these, in the course of a year or two, were given up, and others moved to Ice Fjord, where the ice conditions are better, the post-office was also moved thither, the manager of the whaling-station at Finnes, A. Marcussen, being postmaster until the autumn of 1911, when the office was taken over by the wireless station. The postal rates are the same as in Norway, Green Harbour being considered, with regard to postal matters, as a Norwegian station. Norwegian stamps are employed, and the postmark is Green Harbour. Whereas up to 1911 the post went only now and then between Norway and Spitsbergen, in 1912 a regular post was maintained between Tromsö and Green Harbour by a motor-smack. The same arrangement was continued in 1913, a hired motor-cutter leaving Tromsö for Green Harbour on June 15, July 1 and 15, August 1 and 26, and September 11, after the arrival of the express steamer, and returning from Green Harbour on June 22, July 7 and 22, August 20, and September 2 and 18. Post was also sent with the Vesteraalen Steamship Company's tourist steamer *Andenes* from Tromsö on August 8, returning from Spitsbergen on August 11, and with the Nordenfjeldske Company's ship *Kong Harald* from Tromsö on August 14, returning on August 17, and also as often as a reliable opportunity presented itself.

In old whaling times, post went to and from Spitsbergen as opportunity offered; and as early as 1623 the English maintained a special post-boat on the west coast of Spitsbergen, between the various whaling-stations, from Fair Haven in the north down to Horn Sound in the south. In the seventies and eighties of last century, when the Norwegians fished for cod off Spitsbergen, the post was carried by the small steamers that went to and from the fishing-grounds. At certain of these places post-boxes were put up, which were emptied by these

steamers when they returned to Norway. One post-box, for instance, was put up in Kobbe Bay, on the west side of Danes Island.

In 1912 more than 3700 ordinary postal packets passed through the Norwegian post-office in Green Harbour, besides a good many registered letters; and about 1000 copies of newspapers to subscribers were received at the office.

The Protection of the Fauna and Flora.

Among the states most interested in Spitsbergen, the question has been raised as to the best means of protecting Spitsbergen's fauna and flora. Such protection is becoming more and more necessary with the increase in the number of industrial undertakings and of tourist excursions. At the conference, held in Christiania in 1912, of delegates from Norway, Sweden and Russia, it was agreed, *inter alia*, that occupation of parts of areas that were of special scientific interest should not be allowed. Proposals were also discussed for regulations for hunting and fishing, the employment of poison and explosives, and rules for the protection of the arctic flora.

Professor Geheimrat Conwentz, of Berlin, offered to collect declarations and proposals from authorities on the subject, to lay before the next Spitsbergen conference. Conwentz has put the following six questions:—

(1) In how far is the life of Spitsbergen worth protection and in need of it? Does the fact that Spitsbergen has no overlord place its natural monuments in special danger?
(2) What natural monuments in connection with scenery, geology, botany, zoology, have you specially in view?
(3) By what means can such protection be striven for and obtained? (Combination for protection of special regions on land and sea; for special animals and plants; combination with steamboat companies and industrial undertakings for the carrying through of protection, etc.)
(4) Is it desirable to constitute special parts of Spitsbergen as nature reserves?
(5) What parts have you in view? (Sketch map desirable.)
(6) Have you any proposals to make in regard to the formation and maintenance of such reserves?

These questions, at the request of Professor H. Wille, have been answered by Norwegian experts—Professor Collett, A. Hoel, J. Holmboe, Gunnar Holmsen, Hanna Resvoll Holmsen, Gunnar Isachsen, Professor Kiær, J. Sparre Schneider, and Professor H. Wille—as follows:—

"(1) It must be assumed that the biological conditions in Spitsbergen will not bear any great contact with civilisation without being disturbed. The comparatively easy access to the islands enhances the danger of being exterminated run by certain endemic species.

"On the other hand, due regard should be paid to the economic value which the Spitsbergen hunting has had for years, so that preserving shall not affect to any great extent that time-honoured means of gaining a livelihood. A restricted freedom in hunting, however, is considered beneficial to the stock of game, which it ought then to be possible to utilise more economically than has hitherto been the case.

"(2) Among geological curiosities that may require protection, we will only mention the hot springs in Bock Bay, dammed up by calcareous tufa, which were discovered by Isachsen's expedition in 1910. Among animal and vegetable species that there is special interest in protecting may be mentioned reindeer, ptarmigan, walrus, *Woodsia glabella*, *Aira cæspitosa*, *var. borealis*, *Arctogrostis latifolia*, *Arctophila fulva*, *Glyceria Kjellmani*, *Carex rigida*, *Juncus castaneus*, *J. triglumis*, *Luzula Wahlenbergii*, *Tofieldia palustris*, *Betula nana*, *Alsine Rossii*, *Ammodenia peploides*, *Ranunculus glacialis*, *R. lapponicus*, *R. Palassii*, *Matthiola nudicaulis*, *Potentilla multifida*, *Rubus chamæmorus*, *Vaccinium uliginosum*, *Gentiana tenella*, *Arnica alpina*.

"(3, 4, 5) Complete protection has been suggested for the naturally well-defined area between Ice Fjord, Dickson Bay, and Wijde Bay, including Prince Charles Foreland and the sea lying within a territorial boundary of 30 km., and in such a way that the boundary line follows a line down the centre of the above-mentioned fjords. The reason why so large a region is suggested, is that the areas on which industrial undertakings might have been begun before the protection came into force, might be excepted from the rule.

"The importation of collections of natural objects from Spitsbergen to be forbidden by the respective countries concerned. Dispensation from this rule only to be given by the governments.

"The above-mentioned plants are to be protected all over Spitsbergen. The walrus, moreover, ought also to be preserved without reservation for a period of ten years. With this exception it is not considered necessary to protect any species of animal outside the given area.

"(6) It is the duty of the international legal defence for Spitsbergen to see that the protection regulations are obeyed."

In June 1914, a new Spitsbergen conference, with delegates from all the powers interested, met in Christiania. The proceedings were interrupted, however, by the outbreak of the war, and the conference was adjourned indefinitely.

THE STUDY OF LAND-FORMS IN THE SCHOOL.

By G. B. Mackie, M.A.,
English Master, Bathgate Academy.

(*With Diagrams and Sketches.*)

It is now more than a decade since Geography began to receive a fuller share of attention in the best of our secondary schools. Several years ago even a number of rural schools possessed a plane-table and a few other simple surveying instruments. It is to be feared that after these had lost their novelty they were in too many cases relegated to the lumber-room, and a large number of schools never went further in practical work than a survey of the school buildings and the playground. There is at least one text-book entitled *Practical Geography* that confines itself exclusively to cartography and surveying. In most cases where more practical work has been done, it has been confined to biological excursions.

I propose to show that there is a wide field for further practical work in Geography at present lying fallow. In the main, what I have to say will be an explanation of my own efforts to cultivate this field. Having held appointments in widely separated districts in Scotland, I am in a position to assert that there is no fairly well-populated area where opportunities for the work are absent. Of the multitude of these opportunities I shall have more to say presently.

There is no more fascinating branch of geographical science than the history of land-forms. Few other subjects in the curriculum make so direct an appeal to the child's love for the strange and the wonderful. The common objects of the countryside—hill and valley and stream—acquire a new and undreamt-of significance when they have their place assigned to them in the marvellous scheme of change that alters the face of the earth. To the teacher who has the power of making this revelation, access to actual examples becomes an imperative necessity.

Even under present conditions, I have no sympathy with the plea that there is no time for work of this kind. Time can always be found for work that we are determined to do. Bound down by the most arduous of curricula—that of junior students—I have found time for all that I mention here, and more. With reference to the whole-day excursion, I have never failed to obtain His Majesty's Inspector's permission in the summer session, after the oral examinations are completed; and it is only at this period that such an excursion is possible.

What is the scope of school geomorphology? In addition to the history of the commonest land-forms carried to a point in detail in proportion to the average age and capacity of the pupils or students, it should include at least a superficial explanation of all the features found within a radius of, say, two miles of the school. This will no doubt involve some difficulties, especially if the district has not come within the survey of a capable geologist; but there are few parts of Scotland that have

not been examined by the brothers Geikie, and their books, especially *The Scenery of Scotland* and *Earth Sculpture*, contain what for school purposes is an inexhaustible store of material. It is true that there are formations (*e.g.* kames[1]) for which there is no adequate explanation; but conjecture will add to, rather than detract from, their interest, and will certainly stimulate the obtaining of our chief objective—first-hand explanation.

I propose, then, to deal first with practical work in the immediate neighbourhood of the school, if possible within the school precincts, afterwards to describe, and to make suggestions for, excursions farther afield.

Little apparatus is necessary, and much of that little can be constructed by the pupils themselves. The majority of secondary schools possess a plane-table, a prismatic compass, and a surveyor's chain. Most essential for our present purpose is the six-inch Ordnance Survey map of the district, from which those students who have taken a course in woodwork can construct a relief model. The scale is such that, for most districts, the relief will be sufficiently marked if the vertical scale is approximately double the horizontal. The construction is simple, and is performed in the following manner.[2]

Let the lowest point on the map be between 400 and 500 feet above sea-level, the highest between 1000 and 1100 feet. (These are the actual heights for the district around Bathgate Academy.) Six contour lines will therefore appear on the map, all of the same vertical interval—100 feet. The first thing necessary is a stout board similar to a drawing-board and of the same area as the Ordnance Survey map. It should be slightly more than an inch thick, so that the surface on which it rests may represent sea-level. From the Ordnance Survey map the contour lines are drawn on tracing-paper; these are then transferred to laminae of wood $\frac{1}{4}$-inch thick, which are cut out along the traced lines, the resulting edges representing the contours. The lamina or laminae for the 500 ft. contour are then nailed or glued to the board: on these are placed those for 600 ft., and so on. The model is now ready to receive its coating of plasticene, which may be green or brown. This process will take some time, because, while the coating is being laid on, visits must be made to the actual ground to note the more prominent underfeatures, and these will be indicated by manipulation of the plasticene. This is not absolutely necessary, unless the model is destined for use in connection with excursions. I show streams by bands of silver paper, roads by thin twine, railways by black thread, and woods by stippling; but so many methods will suggest themselves, that the representation of such features may safely be left to individual taste. My own model, for which the vertical scale was double the horizontal, unfortunately received irreparable damage[3] and has been destroyed. I

[1] But on these see Bonney's *Ice-work*.

[2] Cf. the method described by Mr. J. A. M'Michael for $\frac{1}{2}$-inch maps in the *Geographical Teacher* for Spring 1909. Obviously, for such a scale, my method would involve far too much labour and time.

[3] Unless great care be taken, the plasticene, for one thing, soon becomes dirty, and all the methods of cleaning I have attempted have failed.

intend next summer to construct another more restricted in area (probably four square miles) and with a more exaggerated vertical scale, in order

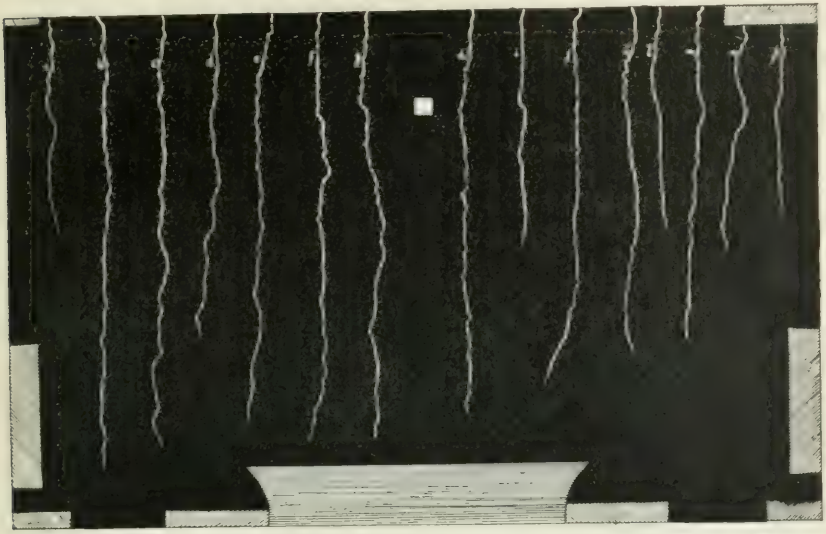


FIG. 1.—Rise of consequent streams in school playground.

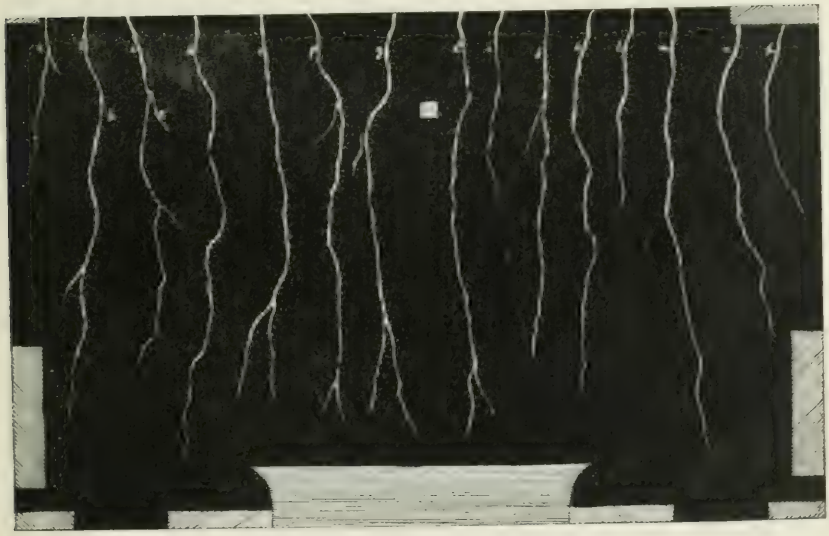


FIG. 2.—Rise of subsequent streams.

that it may indicate some detail in the land-forms. The area may be further restricted and the horizontal scale doubled or trebled, the contouring being done by pupils at V. I. 10 ft. If this process be continued,

we pass from a relief model to a concrete diagram. If time could be found for the necessary survey work, such a model would be a valuable addition to the field excursion.

Obviously, school geomorphology must concern itself mainly with the study of rivers, and fortunately there is everywhere abundant material for practical work in this connection. Most text-books refer to what can be seen in the drainage of every highway and byway. Here, in Bathgate Academy, we are especially fortunate, the playground representing, in an *ideal* way, most of the important developments in the history of a river system. (This in no way detracts from its utility in the purpose for which it was intended, because to the untrained eye there is little evidence of the story that is written on its surface.)

When the playground was constructed in 1833, owing to a steep frontage it had to be raised some fifteen feet at one end above the street, the opposite end being at street level, and the intervening surface horizontal. The material is earth, small stones, and probably a goodly proportion of ashes. There is a slight slope on an even surface from the Academy to the street.

Originally, then, when the first showers came, the state of the surface could not have been other than that represented in Fig. 1, a series of more or less equally powerful consequent streams, flowing practically straight from the buildings to the street drains. These would have been perfectly straight but for the numerous stones which were laid bare when the upper coating of soil was removed, and which were responsible for many of the numerous changes that followed. The relatively steep gradient and the trampling of thousands of feet prevented any great widening of the streams; and the trampling, in addition to forbidding any considerable deepening of the beds in consequence of the gradient, fortunately retarded all subsequent development.

The stage represented in Fig. 2 was not reached until after a lapse of ten years: the period may have been much longer. Wind-borne seeds, little trampling, and a deposit of fertile soil brought down by the streams, resulted in a growth of grass near the Girls' Gate. As this took root and passed gradually towards turf, it had far-reaching effects on the drainage of at least half of the playground. It acted, indeed, in much the same way as many an outcrop of hard rock in the development of rivers. Its roots tended to retain the adjacent soil, which resulted in a more normal gradient and the formation of a transverse barrier. Along the edge of this barrier arose the subsequent streams, b', c', at first puny, but growing in strength, while the main streams remained stationary. Gradually they cut back their headwaters until the stage shown on Fig. 3 was reached. Here the subsequent streams have captured the headwaters of b and c. Similarly, g has captured the drainage of e and f; c' is obviously making for a further conquest. The grass has now taken root firmly, and with the accumulation of sediment near the railing has lost some of its original gradient and stands up as a plateau, with a well-marked semi-circular escarpment. It still retains its beheaded streams, but its drainage is becoming incoherent and sluggish, as witness the various pools in heavy rain, for pretty much the same

reasons as that of the peripheral regions of a glacier. Little change is manifest in the remaining portion of the playground. The steep gradient

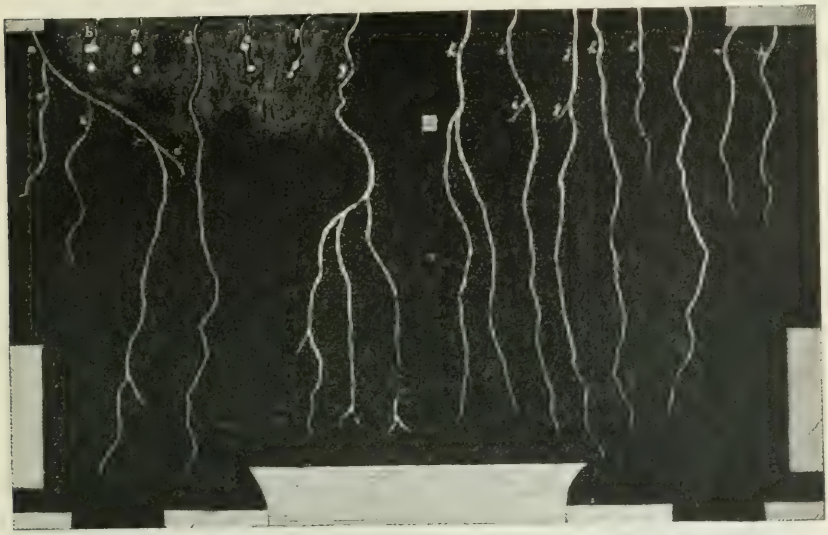


FIG. 3.—Stage of piracy of subsequent streams. Grass shown of lighter area.

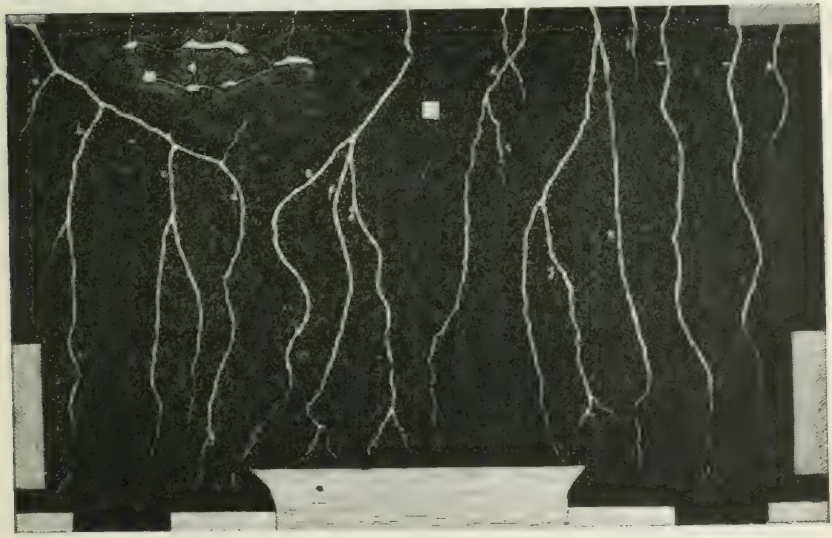


FIG. 4.—Present stage of development. Rise of obsequent streams from grass patch.

discourages meandering, but the stones, which are mixed with the soil, cause slight deviations. The streams are so close together that in one of these they seem likely to fall foul of each other.

The present stage of development is shown in Fig. 4. The strong stream, of which the trunk has arisen from the subsequent tributary *a'*, now dominates the drainage of the south side of the playground, and clearly the development is still immature. *k* and *j*, in their meanderings, have fallen foul of each other, and *j* has captured the headwaters of *i*. The remainder of *i* is in process of annihilation. On the eastern side of the grassy tract, the slope, and consequently the streams, are now reversed, giving rise in heavy rain to the obsequent streams shown in the figure. The drainage of the tract is less incoherent, but sluggish.

Fig. 5 represents my conjectures as to the ultimate development. A glance will show that I have not attempted to say the last word; but the diagram represents an immense development from the featureless

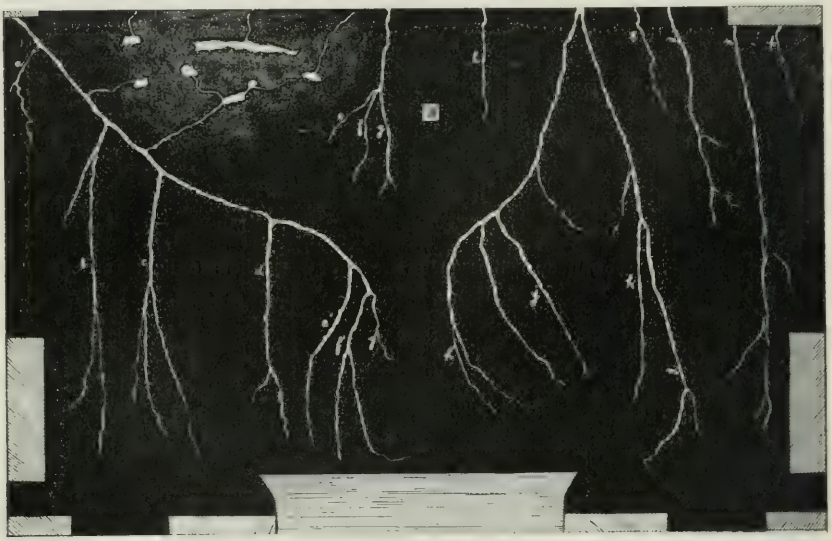


FIG. 5.—Probable ultimate development of streams in playground.

consequent streams in Fig. 1. The stream having its outlet at the Girls' Gate has now captured the headwaters of *e*, *f*, and *g*. There is, indeed, no reason why *h'* should not encounter the same fate. The headwaters of *h* have been captured by *j*. Half the drainage of the playground now uses the outlet by the Girls' Gate, and the major portion is carried off by two widely-ramifying systems.

This description ought to suggest numerous other opportunities to be obtained in the immediate neighbourhood of the school. While far from unique, the playground of Bathgate Academy affords a scope not to be found in the concrete surface usually met with in distinctly urban institutions, but most localities offer individual opportunities, to be developed only by those who know them well.

While no more interesting, the whole-day excursion offers a considerable latitude; so much so, indeed, that geomorphology need form only

a small part of its activities. I make this excursion, in fact, bear upon the whole field of the geography I teach. It is a kind of intensive regional survey, and begins with the first wild-flower we meet by the wayside. Here, however, we are concerned only with its geomorphology. I propose to describe this aspect of an excursion taken by the junior students of Bathgate Academy to Breich on July 8, 1914.

A word first as to its range. Most secondary pupils have access to a cycle, and a twelve miles' ride—going and returning—will fatigue no healthy young person. A radius of six miles from the school must be the limit, however, if a tolerable amount of work is going to be covered.

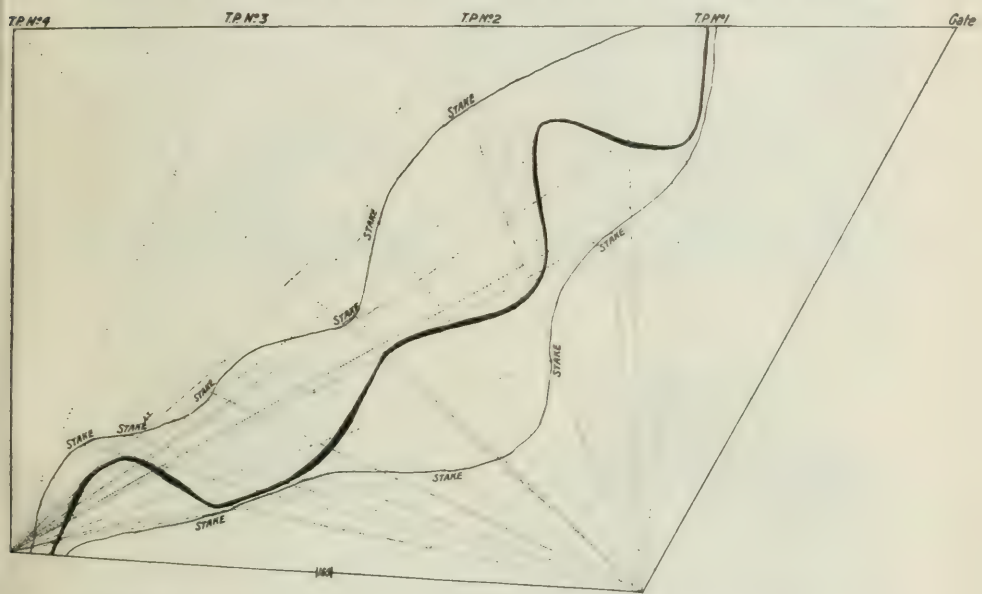


FIG. 6.—Plane-table survey of part of the Woodmuir Burn as actually constructed in the field. The stakes (necessary as stations) ran along the escarpments of the valleys. The area is approximately a trapezium, and the line from Telegraph Pole No. 4 to the Gate is on the south side and runs from east to west.

A preliminary survey of the ground by the teacher is, of course, indispensable. Not that material is anywhere lacking. I have sought it in three counties—Fifeshire, Banffshire, and Linlithgowshire; and everywhere I have found choice difficult, so profuse and widespread is the material. These three counties may be taken as an epitome of Scotland—of the British Isles, for the matter of that—so what has been done there can be accomplished anywhere.

Although, as I have said, geomorphology is but a part of the work of the whole-day excursion, the actual site will, for obvious reasons, be chosen because of the interest of its sculpture. I selected a portion of the Woodmuir Burn between the main highway through West Calder, about two miles to the west of the town, and a byroad a quarter of a

mile to the north, because, on a nearly level tract, the burn was widening its valley by meandering, and a little lower down dashed through a gorge with precipitous sides, laying bare the rocks of the district.

The pupils worked in sections, and each was provided with the one-inch Ordnance Survey map. Those who had taken Higher Geography at the Leaving Certificate examination made a plane-table survey of the stream-valley in the forenoon (Fig. 6), while the others, after a brief lecture, constructed a diagram, showing the present state of the valley, afterwards making others to illustrate its history, anterior and posterior. Fortunately, within half a mile was another valley, that of Breich Water, where the process was to be seen completed: as perfect an example as I have found anywhere, representing almost ideal conditions (cf. Fig. 7). In addition to the diagrams, pupils with artistic gifts made water-colour sketches of both valleys. On the previous day a list of questions had been

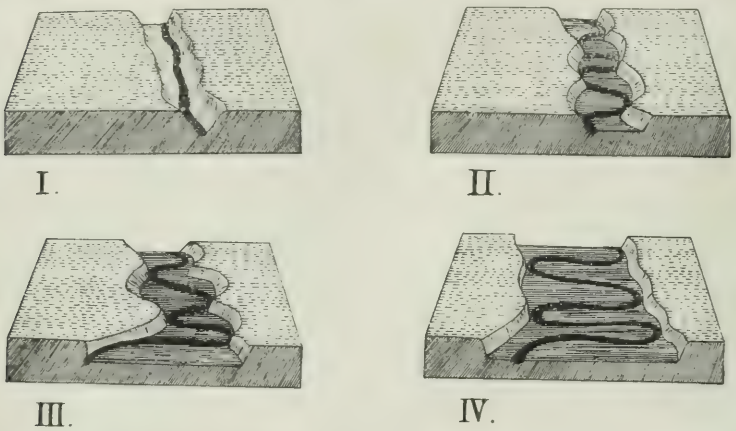


FIG. 7.—Diagrams to show a river developing a flat by side cutting (after Davis). Fig. 8 corresponds to the condition shown in II., Fig. 9 to that in III.

provided relating to individual research. Those having reference to the geomorphology of the district are[1]:—

1. Can the source of the stream be remote?
2. At what point would you imagine the source to be?
3. If the stream rose on the other side of the divide, where would its waters enter the sea?
4. Where do its waters enter the sea?
5. Have you in the course of your journey hither crossed a divide? If the answer is in the affirmative, state your reasons.
6. Is the stream a main river or a tributary? If a tributary, into what river does it flow? Is that a trunk river?
7. Can you tell by examination what is the nature of the soil or rock over which the stream flows?

[1] Obviously some of the questions could be answered only by reference to the map. Some require merely a simple negative or affirmative. None need be completely baffling.

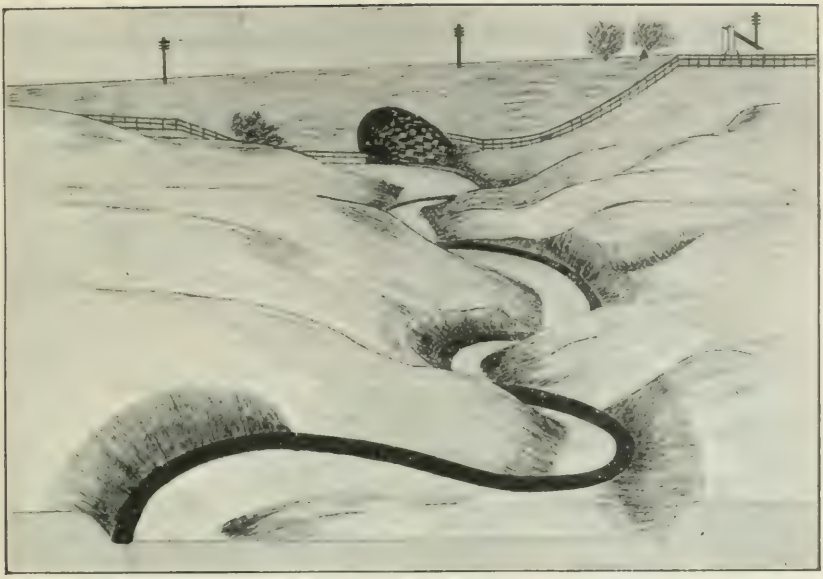


Fig. 8. Diagram showing the Woodmuir Burn excavating a young valley. This stage was passed, of course, *before* the construction of the railway embankment. Cf. ideal Diagram II.

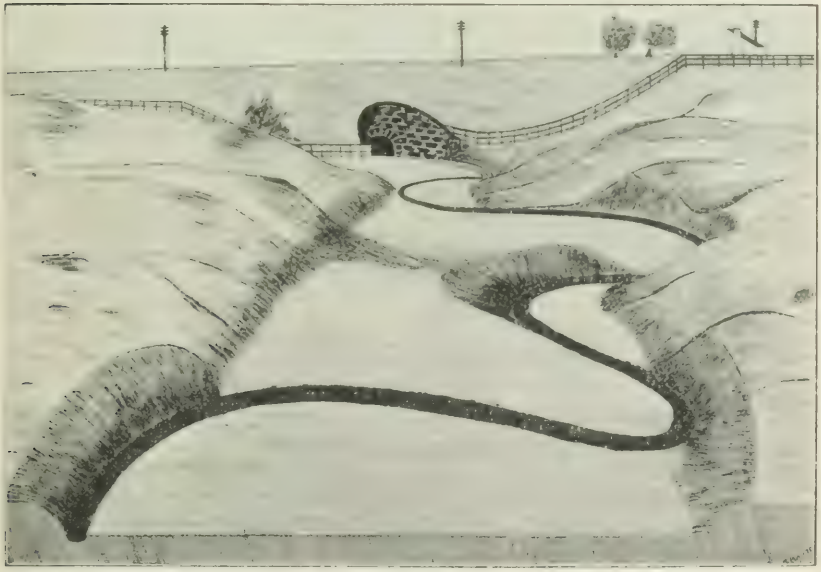


Fig. 9.—Diagrammatic representation of the present state of the burn. Cf. ideal Diagram III.

8. What elements in the soil (*a*) assist, (*b*) resist denudation?
9. Is there any evidence of (*a*) soil creep, (*b*) retention of soil by roots?
10. Make a section of the valley at what you consider the most interesting point. How would the section be altered if the neighbourhood were (*a*) devoid of vegetation instead of grass-grown, (*b*) solid rock?
11. Is the stream still lowering as well as widening its valley?
12. Examine the rate of flow of the stream. Of what part of a normal river's course is the velocity more or less characteristic? If the stream were many times wider and deeper, but of unaltered gradient, would it be suitable for navigation?
13. Examine the bed of the stream. Do you notice any pebbles? Do you see any movement of solid matter? If so, is the movement continuous or intermittent?
14. What evidences are there of animal life in or immediately above the water? How many species can you particularise and name?
15. Is the water clear or muddy? Why? If muddy, will it ever be clear? If clear, will it ever be muddy?
16. Is there any evidence in the neighbourhood of the existence of springs?
17. Is the stream valuable economically (*i.e.* could it be used for *e.g.* power, dyeing or brewing purposes, or water supply)?
18. What type of stream is it—consequent, subsequent, or obsequent?
19. Did it originate in a gully?
20. Is there any evidence in the neighbourhood of the existence of gullies? If so, what can you gather as to their history, past, present, and future?
21. Near the railway bridge on the right bank is a hanging valley. Why does it hang?
22. What is likely to be the effect of the bridge on the future development of the stream?
23. Prod the bed of the stream in several places. Account for the inequalities in its consistency.
24. Examine the course of the current, if necessary by floating sticks. Where is it strongest—(*a*) in the centre, (*b*) at the bank?
25. Can you discover any eddies? What effect have they had (*a*) on the banks, (*b*) on the bed?
26. Is there any evidence of actual or imminent river-capture?
27. In the immediate neighbourhood, is there any superficial evidence of the work of ice? If so, what is the evidence? If not, what, so far as you are aware, is the nearest point where such evidence is to be found?
28. Do you think the valley-bottom is above or below ground-water surface?
29. Why are there no waterfalls in the area under examination?
30. Which of the stream-built features are likely to be (*a*) most, and (*b*) least enduring? Why?

In mid-forenoon we cheered the King and Queen, as the royal train laboured up the steep gradient on its way to Glasgow (an incident not without geographical reference); and at midday a leisurely al fresco lunch followed the exertion of the morning. The afternoon was devoted to an examination of the course of the stream on the north side of the railway. Here the gradient is much greater, sufficient indeed to make the stream a torrent in times of flood. There is consequently much evidence of its destructive power. Where a slight turn in the course has made the stream bear against the bank, this suffers from an attack so resolute and persistent that it has become precipitous, and the rocks underlying the soil are laid bare. A typical example of such a face is shown in Fig. 11,

Fig. 10.—Diagram of portion of valley of Breich Water, of which the Woodmuir Burn is a tributary, showing the process of valley flat formation completed. Cf. ideal Diagram IV.

but no diagram can bring out fully the possibilities of such a formation. The construction of the diagram was part of the pupils' work, and the following remarks are an epitome of what I had to say with reference to the evidence. All deductions of course were attempted by the pupils, my function being merely verification. It is to be noted that the stream is not shown in the diagram. In the foreground is the low (alluvial) left bank; the face illustrated is on the right bank.

The whole stippled surface (A) is covered with screes, rock fragments, and weathered rock. In places these are sufficiently meagre to show the underlying rocks; and at all points they can easily be removed. The whole bank shows a terrace formation indicated at (B), although, the bank being very steep, this is at some points obscured by soil creep. Here and there the soft beds of shale are bent in the direction of this move-

ment. At a very few points on the stippled surface the waste is temporarily held together by small patches of grass, most of which appear to have been islanded from the surrounding turf. The rocks are much shattered by movement, pressure, weathering, and frost (2). At the point where the destruction has been greatest, they have collected as a pile of screes (3). In crevices and joints broom has taken root and is greatly assisting disintegration (1). The rocks consist of calciferous sandstone and shale, lying in alternate strata. Specimens were collected. Shale and sandstone are both of aqueous origin. Shale is an argillaceous rock, *i.e.* it is composed chiefly of clay, although there are other ingredients present. The customary fine fissile structure was here well marked. The calciferous sandstone is probably the calcareous ooze of an ancient sea, and the alternate strata suggest several uplifts and subsidences. Most sandstones weather into poor soil; shales produce clay soils of

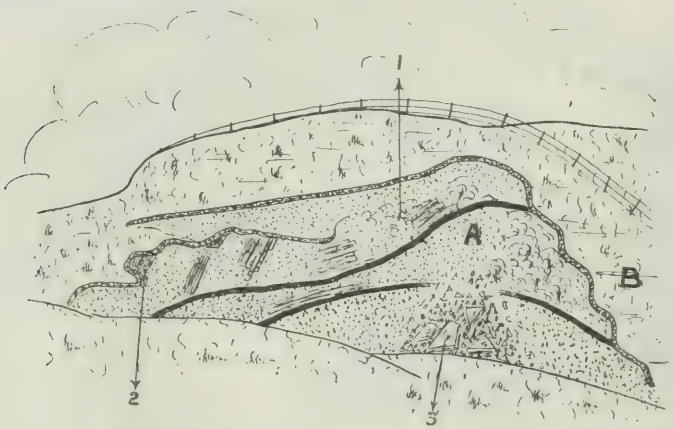


FIG. 11.—Diagram of a steep bank of the stream denuded of its turf. For explanation of letters and figures see text.

greater average fertility, but in some cases they are heavy and difficult to work. Limestones, as a rule, produce very fertile soil. The mixture of calciferous sandstone and shale ought therefore to produce very fertile soil, and several excellent farms are, in fact, known to exist in the neighbourhood.

By the time this work was finished it was after three o'clock. It had been a hard, but perfect day.

The description of this excursion, which is itself but partial, will have shown that there is no difficulty in filling in the day; and, far from there being any necessity for padding, much must be left undone. Suggestions are, on the whole, unnecessary, since the scheme outlined broadens out naturally to any desired limits. Speaking generally, the most suitable site will be an excavation, natural or artificial—quarries (especially on hill-sides), railway cuttings (many disused cuttings exist in mining districts), excavations for the sand used in glass-making, stream-built features, etc.

RUSSIAN TURKESTAN.[1]

APART from the writings of travellers such as Arminius Vambéry and O'Donovan, which are now out of date, comparatively little is known in this country of the immense stretch of territory known as Russian Turkestan, which extends eastward from the shores of the Caspian to the borders of China, and from Siberia southward to Persia, Afghanistan and the Pamirs, the latter table-land separating Russian from Chinese Turkestan. Russia has been in possession for the best part of fifty years of most of the country, though it was only in 1885 that the British and Russian commission was appointed to define the frontier between Afghanistan and Turkestan, and it was in that year that the affair of Penjdeh, which nearly led to a war with Russia, took place.

The author of this book is a famous Russian geographer who spent part of 1912 on a journey through Turkestan, in the course of which he had every opportunity of seeing the country and learning of its conditions. The book does not appear to be a translation from the Russian, but an original work, published in Paris. He leaves out the Eastern Province of Semirietchensk and deals only with the Trans-Caspian province, made up chiefly of deserts, and with the three central provinces of Syr-Daria, Samarkand and Ferghana, all situated in the basin of the Sea of Aral, and also with the semi-independent Khanates of Bokhara and Khiva. The two great rivers in this basin are the Syr-Daria (Jaxartes) and the Amu-Daria (Oxus). The building of the great Russian railway, which runs from Krasnovodsk, on the Caspian, to Andijan, in the east of Ferghana, has made a vast change in the economic conditions of Turkestan.

M. Woeikof describes in detail the formation of the plains and mountains, the wealth of the country in minerals, such as sulphur, coal (of which 40,000 metric tons per annum are produced in the Ferghana), and petroleum. He also furnishes tables of rainfall, temperatures, and of the varying depths of Lake Aral at different seasons. He weighs the evidence of various authorities for and against the theory of progressive drying up of the country. The conclusion seems to be that the sands of the desert continue to invade and destroy the oases, and the author advances a theory that the presence of flocks of Astrakhan sheep contributes to this invasion, through the sheep eating up the vegetation which alone can struggle against the advance of the sands. The glaciers in the mountains from which flow the rivers of the Aral basin are also said to be shrinking, causing a diminution in the volume of water, but observations made in recent years appear to contradict this. The author's conclusion is that the whole subject is a very obscure one which can only be cleared up by prolonged observations. He quotes Prince Kropotkin, who says that the drying up of the land in Turkestan and central Asia was the first cause of the incursions of nomads into central and southern

[1] *Le Turkestan Russe.* By A. Woeikof, Honorary Professor of Physical Geography in the University of St. Petersburg. Paris: Librairie Armand Colin, 1914. *Price* 8 *fr.*

Europe, but remarks that this theory is not new, as it goes back to Gibbon, and probably much further.

The province of the Ferghana consists of a valley watered by the upper course of the Syr-Daria, and is fertile, thanks to its system of irrigation. Here cotton has been cultivated to a large extent for the past twenty years, and various industries which have sprung from this are carefully fostered by the Russians. One company instanced by M. Woeikof has installed meteorological stations expressly for the purpose of studying the influence of climatic conditions on the growth of the cotton; and he was asked to lecture in the splendid hall of the Bourse at Kokand on the utility of such observations. This seems worth notice as an instance of Russian progress in Turkestan. On the other hand, the roads are impassable in winter, and the Syr-Daria does not boast of a single bridge. "La cause de cette mauvaise organisation est dans les institutions du pays, archaïques et ne répondant pas aux progrès économiques."

The Trans-Caspian Province is the least inhabited of Turkestan, for the desert predominates, and, even at Krasnovodsk, drinking water is got by distillation from the Caspian.

Arrived in Bokhara, M. Woeikof forgets his economic studies for a moment, and indulges in description of the picturesque side of the old city, with its narrow, tortuous streets, its 364 mosques, and 138 schools. "Les bazars de Boukhara sont animés et pittoresques à l'extrême. La lumière, tamisée par des nattes, y contribue beaucoup, ainsi que les habits multicolores de la population. Les habitants tiennent beaucoup aux beaux costumes; les étoffes aux dessins bariolés son très en vogue." The Khanate retains its nominal independence, but "les habitants parlent toujours de la réunion du khanat à la Russie. Les Mussulmans les plus pieux redoutent cet événement, mais la plupart des sujets de l'Émir le verraient avec plaisir. Ils ont des relations constantes avec les indigènes sujets russes et savent que ces derniers se trouvent beaucoup plus favorisés." M. Woeikof does not believe that annexation is desirable. Rather he counsels placing the Khanate under Russian administration, but without formal annexation, for he considers that Egypt is better administered than British India, and Tunis than Algeria. "Dans le Turkestan russe, on a introduit beaucoup de lois qui ne conviennent pas au pays. L'administration y est trop compliquée, les fonctionnaires trop nombreux; tout cela pourrait aller beaucoup mieux si le Boukhara était soumis à une administration russe, mais sans annexion formelle."

In view of the above it is not without significance that the father of the present Emir has built a villa at Yalta, on the south shore of the Black Sea, and that he makes frequent trips into Russia.

M. Woeikof also gives an interesting account of his journey by the Amu-Daria into the Khanate of Khiva and of his reception by the Begs, but we cannot do more than refer to it here.

M. Woeikof asks the question. What are the advantages to Russia of the acquisition of Turkestan? and the reply may be best summarised in his own words, "La conquête s'imposait: elle a mis fin aux incursions des nomades, encouragées par les souverains du Turkestan, l'Emir de

THE LATE EARL OF STAIR

Photo by Lafayette, Glasgow

Boukhara et les Khans de Kokand et de Khiva ; elle nous a donné un pays béni de soleil, un pays riche en produits agricoles, qui ne pouvaient être cultivés ni dans la Russie d'Europe, ni dans la Sibérie." Turkestan furnishes nearly half of the cotton used in Russian factories, and is a great market for the products and manufactures of Russia ; while, now that railways are built and brigandage suppressed, the trade of the neighbouring lands, such as the Persian province of Khorassan, the northern part of Afghanistan, and Kashgaria, are open to Russian trade and Russian influence. To the inhabitants the Russian conquest has brought peace and security, and an administration, doubtless imperfect, but vastly superior to that which preceded it. These are large claims, but they are probably true, and a perusal of M. Woeikof's book, wherein his case is modestly and moderately stated, cannot but be of interest, particularly at this juncture, in showing how Russia is carrying out her civilising mission in regions which many of us have regarded as the waste places of the earth. J. D. M.

OBITUARY.

THE LATE EARL OF STAIR.

At the Annual Meeting of the Royal Scottish Geographical Society, held on 10th November 1914, the late Lord Stair was unanimously re-elected President of the Society. Lord Stair was first elected in 1910, in succession to Professor James Geikie, and at the time of his death, which took place suddenly on 2nd December 1914, he had entered on his fifth term of office.

It is natural and right that a Society like ours should, at least from time to time, fill its highest office with a President of ancient Scottish lineage, whose ancestors have rendered distinguished service to the State. In the Peerage there are many older titles, but I doubt if any Scottish noble family has produced, in immediate succession, as the Stair family has done, a Lord President of the Court of Session (whose great book, entitled *The Institutions of the Law of Scotland*, published in the seventeenth century, has made, and kept him, by universal acknowledgment, his country's greatest jurist), a Secretary of State, and a Field Marshal, next in command under George II. at Dettingen.

But Lord Stair was no mere figurehead, any more than any of his predecessors in the presidential chair. A glance at their names will show the width and variety of the interests they represented, and, at the same time, the wisdom of their selection by the Society :—

The Earl of Rosebery, . .	1884-1889.
The Duke of Argyll, . .	1889-1894.
The Marquis of Lothian, . .	1894-1899.
Sir John Murray, . . .	1899-1904.
Professor James Geikie, . .	1904-1910.

The objects of our Society strongly commended themselves to Lord Stair's common sense and practical nature. He delighted to attend our public lectures, and the audience always gave him a hearty welcome. They could rely on his saying just what a chairman, introducing a lecturer, needs to say, and omitting all the platitudes, which so often irritate the audience, and stand between them and the impatient and nervous man they have come to hear. But he was interested in much more than the dash of romance, and adventure, which makes our lectures popular. He took a keen interest in all the three aspects of geographical work, which render it of essential importance to the world, namely, the commercial, the scientific, and the missionary. The latter aspect appealed strongly to the religious and philanthropic side of his nature, which, with all his aversion to sentimental display, was very pronounced. He thoroughly believed, with David Livingstone, that "the end of the geographical feat is the beginning of the missionary enterprise." That the scientific and commercial aspects of geographical science were not neglected by the Society during his Presidentship appears from such illustrious names, among the list of lecturers in his time, as those of Sir John Murray, Captain Amundsen, Sir Harry Johnston, Dr. Nansen, and Commander Evans.

Lord Stair had a very high sense of duty. On many occasions, with characteristic unselfishness, he put himself to great inconvenience to discharge the duties of his office as President. We are sad to think that we shall never look again upon his manly figure, in the chair of the Society, and that we shall never again listen to those brief but hearty speeches, which were the outcome of a nature singularly straightforward, singularly guileless and unassuming, and singularly genial.

CHARLES J. GUTHRIE.

PROCEEDINGS OF THE ROYAL SCOTTISH GEOGRAPHICAL SOCIETY.

LECTURES IN JANUARY

MR. STEPHEN GRAHAM will deliver his lecture in January on the following dates:—Aberdeen the 25th; Dundee the 26th; Edinburgh the 27th, and Glasgow the 28th. The title of his lecture will be "The Soul of Russia."

GEOGRAPHICAL NOTES.

EUROPE.

A Survey of Dartmoor.—Professor Camille Vallaux contributes to the *Annales de Géographie* for July 15 an article on Dartmoor which, though it does not contain much that is new, has value as a view through foreign eyes. Naturally special stress is laid upon the resem-

blances and differences as compared with Brittany, both as regards natural conditions and the life of the people. The similarity of the conditions necessarily brings with it a certain basal resemblance in habitations and so forth, but it is gratifying to know that M. Vallaux finds that even in the remote villages men, houses, and possessions are better kept on our side of the Channel than on the other. A marked contrast exists as regards land utilisation. In Dartmoor there persists the type found in the Brittany of a century ago—that is little cultivation, little clearing of uncultivated land, what one may call migratory pasturage, with a predominance of sheep, and, in spite of a relatively high birth-rate, a decreasing population. In Brittany the peasants are continually extending their cultivated lands by reclaiming waste ground, sheep do not predominate among their flocks, and open pasturage is replaced by stall-feeding. The result is seen in the absence of rural depopulation.

Italian Statistics.—Two volumes containing the details of the Italian census of 1911 have recently reached us and, together with the *Annuario Statistico Italiano, Anno 1913* (published 1914), give a number of interesting facts in regard to that country. At the date of the census there were in Italy in round members 34,700,000 persons, to which figure should be added over one million Italians temporarily absent from the country. On the first of January 1913 the number in the country was estimated to have increased to 35¼ millions. At the 1911 census the number of females exceeded that of males by over half a million. The number of emigrants is increasing, both as regards the total and as regards the percentage. In 1913, 870,000 Italians left their country, of whom more than half a million went to trans-oceanic countries. As might be expected, the poor province of Calabria yielded the highest percentage of emigrants, but it is curious to note that Venetia had a percentage scarcely less, and an absolute total which was much greater. It is to be observed, however, that a relatively very small percentage of the Calabrian emigrants went to other parts of Europe or to the Mediterranean basin, most crossing the ocean, while the Venetian emigrants mostly remained in the Old World.

Italy, in marked contrast to the small northern nations (cf. vol. xxx. p. 598), has always been noted for its high percentage of illiterates, but the statistics show that steady improvement is taking place. The rate is much higher among the females than among the males, but this discrepancy is greater in the higher age groups than in the lower, showing that of recent years female education has been improving. Thus in Italy generally only 30 per cent. of women over sixty years of age can read, while among men of the same age-group the figure is 48 per cent. On the other hand some 76 per cent. of boys between twelve and thirteen can read, and the percentage among girls of the same age is only slightly less (about 75 per cent.). The distribution of illiteracy is interesting. It is greatest in poor and depressed Calabria, where of females of six years and upwards less than 22 per cent. can read, and of males less than 41 per cent. This illustrates a point of some interest that

where the total rate is low, there the discrepancy between the sexes is greatest, and where it is high there the rate for the two sexes approximates closely. Piedmont and Lombardy keep their proud position as the most literate provinces (Piedmont—males 91 per cent., females 87 per cent.; Lombardy—males 87 per cent., females 86 per cent.), but it is somewhat remarkable that in Tuscany the rate should be relatively low, less than 60 per cent. of the women being able to read.

Among the agricultural statistics we note that it is Piedmont, not Lombardy, as is generally assumed, which leads the way in rice production, with an area of 173,000 acres out of an Italian total of 358,000 acres. The only other provinces which produce any notable amount of rice are Venetia and Emilia. The two latter provinces, again, are the only ones yielding any considerable amount of sugar beet, of which the total Italian yield is some $2\frac{3}{4}$ million tons. A good deal of rice is exported, especially to the Argentine, but Italy's sugar does not suffice for her own use, so that there is a small import. In connection with agriculture the diseases which especially attack the agricultural population are of interest. The Year-Book shows that the number of persons attacked by pellagra is steadily diminishing, the diminution being over 50 per cent. in the period 1899-1910. This is not, however, the case with malaria, which shows oscillations year by year both in the number of cases and in the number of deaths, but is not apparently tending to disappear, as it is in some tropical regions.

The French Geographical Journals.—Our supply of French geographical journals ceased at the outbreak of war, and we are therefore all the more glad to welcome the reappearance of the *Revue Générale des Sciences*, a copy of which, dated November 20, and comprising issues for August and September, has reached us recently. The number contains the manifesto issued by the German professors "représentants de la science et de l'art allemands," to which the editor prefixes a very brief introductory note, and adds also a quotation from the *Journal de Genève* containing a protest by Dr. Fritz Staudinger against the action of the authors of the manifesto, by which he says "neither the force of our arms nor the honour of our name can gain anything."

Among the matters of geographical interest in the issue we note a well-illustrated article by Prof. Otto Nordenskjöld on the social life of the Eskimo in the Danish colonies on the west coast of Greenland, in which it is stated that of recent years the population has been showing a rapid increase.

Asia.

Dr. F. de Filippi's Asiatic Expedition.—In the *Geographical Journal* for December there appears a letter from Dr. de Filippi which brings the story of his expedition down to the end of August last, the most interesting part of the communication being that which relates to the exploration of the Remo glacier. It was found impossible to carry out the proposed gravity observations on the Rukshu or Rupshu plateau

(cf. vol. xxx. p. 325), owing to the amount of snow present there in April. After making various expeditions from Leh during last spring, the whole party set out across the Chang La pass (about 18,000 feet) in the middle of May, and reached the village of Shyok without difficulty. They then travelled up the Shyok valley for eight days, before turning off into a side valley which brought them to Kisil Langur, at the edge of the Dipsang plateau. From this point depôts were laid for the exploration of the Remo, which proves to be much larger than was anticipated. The exploration was a matter of considerable difficulty, owing to the bad weather which prevailed during most of July and part of August, the party being caught by snowstorms in the high camps at heights of 19,000 and 19,300 feet, storms which ultimately made a hasty retreat necessary.

The Remo proves to be formed by two large glaciers, a western and a northern one, which meet nearly at a right angle at the base of their valleys, and end at a height of about 16,000 feet in a single common front, about 300 feet high, which fills the whole of the Shyok valley. The glaciers are from 22 to 24 miles long and 2 to 5 miles broad, and their total area is about 240 square miles. The northern branch is the larger of the two and ends in a huge basin, lying at a height of 19,700 feet, which is filled to the brim with ice. The ice appears to overflow the watershed between the isolated peaks, which stand like islands in its midst. Into this great basin comes a large tributary glacier, which bifurcates before it joins the Remo, and sends a short, wide and thick tongue over the watershed. This tongue gives rise to the headwaters of the Yarkand river, which, a few hundred yards below its origin, receives an important tributary also coming from a glacier which over-rides the watershed. Thus we have here the peculiar condition that one glacier gives rise at once to the Shyok, a tributary of the Indus, and to the Yarkand, which ends in the deserts of Central Asia. The condition, it may be noted, recalls that believed to have existed in the Alps during the Ice Age, when glacier tongues often over-rode the watershed.

In the middle of August the party received news up the Shyok valley of the great European conflagration, which led to some of the party returning to Italy. The remainder crossed the Karakoram pass on August 20, and thereafter divided. One party continued down the Yarkand valley, and the other crossed the Suget pass, and came down to the small Chinese fort at its foot, in the Kara Kash valley. It was from this point that the message was sent off, and the intention was then to cross into the Yarkand valley over the Kirghiz Dawan in early September. According to the daily press, further letters have been received from Dr. de Filippi from Yarkand, and also from Tashkent, the latter dated November 18. The explorer does not expect to return to Italy till March next, but has completed the work of the expedition.

Africa.

The Agricultural Resources of Zanzibar.—Mr. F. C. M'Clellan contributes to the *Bulletin* of the Imperial Institute (vol. xii. 3) an article

on this subject, in which he emphasises the unfavourable effect of the abolition of slavery upon Arab agriculture in the islands forming the Protectorate. The status of slavery ceased to be recognised in 1897, and since that date the prosperity of the Arab landowners has steadily diminished, and their properties have deteriorated. The former slaves do little or no work, but squat on the lands of their former owners. The work of the plantations is done either by mainland natives, who are attracted by the high rates of pay, or, in so far as the picking of the clove crop is concerned, by the natives of the islands. In the island of Zanzibar these natives are called Wahadimu, and in Pemba Wapemba. They live on the less fertile coast-belts of the two islands, were there prior to the Arab conquest, and were never enslaved. They obtained their living formerly by fishing, and the cultivation of such crops as sorghum, peas, maize, etc., and mixed little with the other inhabitants. Now, as stated, they are beginning to take part in the harvesting of the cloves, but, though apparently increasing in number, do not meantime furnish a supply of labour large enough to permit of great extension of cultivation. As is well known, cloves, introduced about 1818 by the Arabs, still form the most important crop of the islands. They laid the foundation of Arab prosperity, and the whole economy of the region was adjusted to this crop. With the abolition of slavery the delicate local adjustments were destroyed, and the Protectorate thus furnishes another example of the want of adaptability which results from the use of slave labour, and brings in the long run economic disaster to the slave owners. According to the author the days of the Arabs as the leading agricultural community in Zanzibar are numbered.

Zanzibar and Pemba together produce over 90 per cent. of the world's crop of cloves, and of the two Pemba is the better suited to the crop, and contains about two-thirds of the cultivated area. The trees are long-lived, many of those in Pemba being eighty to ninety years old. The Arabs have long ceased to raise new plantations, and the area of young woods is now small, though it is stated that the attention of the government is being directed to this matter. After the clove plantations the coconut forms the most important crop, and the number of trees is on the increase. At the same time it is said that the order and precision observable in the original Arab clove plantations is absent from the palm groves, and the copra produced is not of good quality. No coir fibre is produced at present, and it is stated that there is still much unplanted land capable of bearing coconut trees. A large number of other tropical plants have been or can be grown in the islands, but with regard to most of these the difficulties in connection with labour, the obtaining of the necessary capital, and the acquisition by the labourers of the necessary skill are great.

America.

Opening of Cape Cod Canal.—In various of the American geographical journals, notably in the *Bulletin* of the American Geographical Society for November last, accounts are given of the opening of this

canal, which has been under construction for seven years. The canal cuts through the narrowed region where the long, hook-like arm of Cape Cod is attached to the continent, and reduces the sea passage from Boston to New York from 334 to 272 miles. The shortening of the distance is not, however, the only advantage, for the voyage round the cape is full of risks, due both to fogs and to storms. It is asserted that in the last fifty years the number of wrecks has averaged 35 per annum.

The total length of the canal from Cape Cod Bay to Buzzard's Bay is 7½ miles, and the ground cut through had a maximum height of 29 feet. The canal is a sea-level one, with a depth of 25 feet at mean low-water. The commerce passing round Cape Cod is estimated at 25,000,000 dollars, per annum, and consists chiefly of raw materials, notably coal and wood, often carried in barges. It is expected that it is this traffic for the most part which will use the canal, though it may also be utilised by passenger boats. The idea of such a canal is old: it was discussed as early as 1697 by the General Court of Massachusetts, and its construction was urged by Washington during the Revolutionary War. The construction has now been carried out by a private company at an outlay of 12,000,000 dollars.

Polar.

Physical Geography and Glaciology of Antarctica.—Mr. Griffith Taylor contributes to the *Geographical Journal* for October, November and December a series of interesting articles on certain Antarctic problems. In the first place he expresses himself as a supporter of the view that there may be two Antarctic continents, or that at least a belt of lowland, which may or may not be flooded by the sea, runs across from the Ross Sea to the Weddell Sea. He publishes an interesting sketch-map to illustrate his theory that the mountains of South Victoria Land are continuous with those discovered by Filchner in Prince Leopold Land, and correspond to the marginal mountains of eastern Australia. Again, he considers that the Alps of New Zealand mark a fold line which he believes may be found to be continued in another range stretching from Edward VII. Land along West Antarctica to Graham Land. According to this view, the supposed sea which separates Antarctica into two land masses would be the equivalent of the Tasman Sea between eastern Australia and New Zealand.

In discussing the climatic conditions Mr. Griffith Taylor points out that the enormous mass of elevated ice-covered land in the Antarctic must have a great effect on the climate of the world. The high plateau forms an enormous cold storage reservoir, which has perhaps more effect in producing the comparative coolness of the southern continents than the existence of the huge southern ocean, the cause which is generally given. Further, the excessive coldness of the Antarctic plateau makes the region one, in the author's opinion, in which glacial erosion is not taking place on a large scale. The basis of this apparent paradox is the relative infrequency of morainic matter on the great glaciers and the clearness of the glacial streams of summer, as compared with the

milky torrents of the Alps. The theoretical explanation of the slow erosion demands more careful consideration. The author recognises three great types of glacial action, usually simultaneously present in a region. There is first the protective action of the ice-cap, which prevents the ordinary agents of erosion from acting on the concealed surface. Second, we have the erosive effect of great valley glaciers, due to their mass and movement, resulting in the formation of broad, U-shaped valleys. Finally, in regions where frost and thaw alternate, that is in regions of considerable temperature variation, sapping action takes place, causing, on steep enough slopes, the formation of cirques. It is one of the interesting features of the mountains of South Victoria Land that cirques are abundant, though the conditions favourable to their formation do not now exist. How, then, can their existence be explained? Mr. Taylor, to answer this question, goes back to a time when elevation was taking place in South Victoria Land. He compares the conditions here, as we have already suggested, to those that exist off the east coast of Australia. In the latter region there has been elevation *en bloc*, accompanied by faulting and formation of *Senkungsfelder* on the seaward side of the rising land. Running water has since carved the steep scarps so as to form waterfalls and deep canyons. In South Victoria Land, he believes, the great range of coastal mountains arose in a similar fashion by faulting in late Tertiary time. On the seaward side it is separated from the sea by a *Senkungsfeld* area formed of foothills of about 3000 feet elevation, while on the landward side the land slopes to a high plateau, much as it does in Australia, though the elevation both of the coastal mountains and of the interior plateau, is, of course, enormously greater. But while in Australia erosion of a normal type has taken place, in South Victoria Land, though on one side rivers of ice enter the sea, in an approximately normal fashion, on the other there is a uniform sheet of inland ice, "without sub-division, variation or boundary." The ice-cap Mr. Taylor believes to have a thickness of about 2500 feet. He regards it as a relic of earlier moister and warmer conditions, rather than as caused by existing ones. It has but little movement, and probably covers a peneplain whose surface is thus protected from erosion. But prior to the development of this protective ice-sheet there must have been a period at the dawn of the Ice Age when cirque formation, *i.e.* glacial sapping, was at its maximum. By a detailed study of certain of the existing glaciers, he endeavours to show that their valleys can be regarded as the result of the swamping and obliterating of earlier cirque glaciers by larger ice-streams of later date.

General.

The Scottish School of Geology.—Professor Thomas Jehu, formerly of St. Andrews, who was appointed Murchison Professor of Geology and Mineralogy in the University of Edinburgh on the retiral of Professor Geikie, devoted his inaugural lecture at the beginning of the present session to "The Rise and Progress of the Scottish School of Geology." The lecturer pointed out that James Hutton, whose *Theory of the*

Earth was published in 1795, was not only the founder of the Scottish School, but also the Father of British Geology generally. The subsequent divergence of the distinctively English School was correlated, in an interesting fashion, with the contrast between the geology of the two countries. In Scotland, and especially round Edinburgh, the prevalence of volcanic rocks, often forming striking land features, naturally led geologists here to the study of vulcanicity, and it is important to note that Hutton and his followers, in contrast to Werner of Saxony, who regarded all rocks as deposited from water, distinguished between such rocks and those formed by igneous action. Hutton even further laid the foundations of Lyell's subsequent theory of Metamorphism. In England the presence of fossiliferous beds, comparatively rare in Scotland, permitted William Smith to lay the foundations of stratigraphical geology, and led to a temporary eclipse of the Scottish School, an eclipse rendered more marked by the adoption in Edinburgh by Professor Jameson of Werner's views as against Hutton's. By the middle of the nineteenth century Scottish geology was enriched by the labours of such intellectual giants as Sir Charles Lyell and Sir Roderick Murchison, both of Scottish birth, though much of the work was done south of the Tweed. Murchison contributed half the endowment of the chair of geology in Edinburgh University, which was established in 1871, the subject of geology having previously been combined with Natural History. The first occupant of the chair was Sir Archibald Geikie, whose presence at Professor Jehu's opening lecture added much to the interest of the proceedings. He held office for eleven years and was succeeded by his brother, Professor James Geikie. The latter part of the lecture was devoted to an account of the work of the brothers Geikie, and their influence upon the development of geological thought, at home and abroad.

Soil-fertility and its Causes.—In his presidential address to the section of agriculture at the Australian meeting of the British Association, Mr. A. D. Hall made a number of statements of geographical interest. For example, he spoke of those black soils, of marvellous fertility, which are found in various parts of the globe, notably in the Russian steppes, in the prairies of North America, in the Argentine, in parts of India, in parts of New Zealand, and so forth. It is not the fact that some of these soils had not been cultivated till recent times which makes them valuable, for we now know that not all virgin soils are fertile. All these rich black soils, however, are found to contain a considerable amount of carbonate of lime, and to lodge the organism called Azotobacter, which can fix free nitrogen from the air. The soils are found in steppe regions of moderate rainfall, where under natural conditions the surface bears a covering of bushes or grasses. The periodic decay of these supplies sufficient organic matter for the use of the micro-organism, and the result of its activities is to constantly enrich the soil, which may accumulate to the depth of several feet. If, on the other hand, carbonate of lime is deficient in a soil the organism does not flourish, and the nitrogen added each year by the decay of one season's growth merely makes up for what was removed during the growing period. That is, the nitrogen shows merely a cyclic

movement, and the soil, even if uncultivated, does not become richer with time. In certain soils, further, when carbonate of lime is virtually absent, not only is there no Azotobacter present, but the ordinary organisms of decay are also absent, so that the soil becomes acid, and peat forms. Thus Mr. Hall believes that peat may form "spontaneously," that is, without any climatic change leading to surface water-logging, so that progressive infertility develops, leading to the disappearance of an original forest cover, and its replacement by heath vegetation. Mr. Hall thus lays great stress upon lime as an important element in fertility. According to the extent to which it is present, we may have a soil which becomes automatically richer, one which neither gains nor loses nitrogen under natural conditions, or one which becomes progressively more and more peaty and impoverished. The paper goes on to discuss the reclamation of moors and heaths in Germany, and the possibility of applying similar methods in the British Isles. Mr. Hall admits that various economic difficulties present themselves here, and we have of course to realise that the existence of large tracts of fertile and as yet unworked land in the overseas dominions tends to diminish initiative as regards land reclamation at home.

Commercial Geography.

The Tin Resources of the World.—Two recent issues of the *Bulletin* of the Imperial Institute give a series of striking facts and figures in regard to the world's sources of tin. It is a somewhat curious fact that while for long the tin mines of Cornwall furnished the greater part of the world's supply of the metal, now the British empire yields considerably more than half the total output—some 60,000 tons out of a total of about 115,000 tons. Of this total the Federated Malay States, particularly Perak and Selangor, produce by far the greater part, some 44,000 tons in 1911. Bolivia, with nearly 22,000 tons, and the Dutch East Indies, with about 20,000 tons, are the only regions producing anything like comparable amounts. The following regions, which are arranged in order of importance, yield amounts varying from 7000 to 2000 tons per annum—Australia (especially Tasmania, Queensland, and New South Wales), China, Siam, United Kingdom, Union of South Africa, Nigeria. All other sources only produce insignificant amounts.

EDUCATIONAL.

Relief Model of Part of Central Europe.—We have received on loan from Messrs. Geo. Philip and Son, Ltd., an example of their Relief Model Map of Central Europe, constructed to illustrate the topography of the main theatres of the present war. The model, which costs £6, 6s., measures 62 by 35 inches, and is on a horizontal scale of 18 miles to the inch, and a vertical one of 5000 feet to the inch, so that the heights are exaggerated nineteen times. This is, of course, a notable exaggeration, and has the effect of making, *e.g.*, the Vosges and the Black Forest region seem more formidable obstacles than in point of fact they are. At the

same time the fact that the model is continued far enough northward to show the familiar region of the Pennines and the Lake District gives a means of correcting the false impressions which might otherwise be obtained. Political boundaries are shown, and also towns in red, but neither roads nor railways. A few of the main railway routes across the European plain would, we think, have been an improvement.

The model, which will be exhibited in the Society's Rooms for a couple of months, is worth careful study, especially in conjunction with the display of war maps there, the collection of which is now very complete. Its surface shows well the continuity of the Central Plain from Russia westwards to the margin of the North Sea and the Channel, and thus makes clear at once the exposed eastern frontier of Germany, and the military reason for the violation of Belgian neutrality. Most of the places which have become famous in the western war area are marked, and it is possible to follow very clearly the battle lines of the Marne and of the Aisne, the fighting in the Argonne region, the conflicts round Ypres and the Yser, and so on. Among minor features which are well shown, we may point to the position of the gap of Toul, due to the fact that a stream which once ran into the Meuse has been captured by the Moselle, and the deserted valley forms an open groove between the two rivers, a groove through which passes the railway from Paris to Toul and Nancy. The position of Reims, also, placed as it is on a natural line of communication between Champagne, Burgundy, the middle Rhine valley and the Low Countries, is clearly seen, and it helps to explain the constant bombardment of that ill-fated city, whose splendid cathedral illustrates its early importance as a crossing point of routes. Many other interesting facts emerge from a close survey, and we recommend the model to the notice of our members, teacher and other.

Association of Scottish Teachers of Geography.—The annual general meeting of the Association of Scottish Teachers of Geography was held in the Society's Rooms on November 20. The following office-bearers were elected for the coming session:—*Chairman*—Mr. Geo. G. Chisholm. *Vice-Chairmen*—Mr. James Cossar, Training College, Glasgow; Mr. Philip, Aberdeen. *Hon. Secretary*—Mr. T. S. Muir, Royal High School, Edinburgh. *Committee*—Mr. Findlay, George Watson's College; Mr. Macgregor, Boroughmuir H. G. School; Mr. T. L. Millar, Sciennes Public School; Mr. Matheson, M'Laren H. G. School, Callander; and Miss Lennie.

It was agreed to have a course of three lectures on some geographical aspects of the war, the first to be given on January 15, 1915, the others to follow at intervals of a month. Mr. T. S. Muir then gave an address on "Some Geographical Aspects of the Alps." Beginning with a sketch of the main results of the complexity of the structure, surface, and geological formations of the alpine region he proceeded to discuss the chief strategical features and the relation of the main watershed to political boundaries. In conclusion he outlined some general principles which he considered were bound up with the true choice of an ideal frontier.

NEW BOOKS.

EUROPE.

Argyleshire and Buteshire. By Peter Macnair, F.R.S.E., F.G.S. Cambridge: The University Press, 1914. *Price* 1*s.* 6*d.*

This volume, though the get-up is somewhat different from preceding issues, may be regarded as one of the Cambridge County Geographies, and forms an excellent handbook to the two counties. In this case the book is written by a trained geologist, so that we expect to find the strictly geographical sections well done, and this is the case. Physical features are excellently described, and special attention should be here drawn to such paragraphs as those appearing on pp. 5, 9, 13, and 112. We would wish also to recommend section 7—Geology and Scenery, and section 9—Along the Coast. The diagrams on pp. 19, 54, 118, 120, 135, are illuminating, and the many illustrations are illustrations in the best sense.

Brussels and Antwerp. A Practical Guide. Second Edition.
Berlin and Environs. Fourth Edition.
Grieben's Guide-Books. London: Williams and Norgate. Berlin: Albert Goldschmidt, 1914. *Price* 1*s.* 6*d. each.*

Neither of these guides is unfortunately likely to be useful meantime. In the Belgian book the town of Malines, of—as yet—the most tragic associations of the three, is included as well as the two cities named in the title. Now that the books have run into several editions we think that the English publishers might see their way to improve the translation, which in many places leaves much to be desired.

Things Seen in Sweden. By W. Barnes Steveni. London: Seeley, Service and Co., 1915. *Price* 2*s. net.*

A pleasant little book which, like the other members of the series, is very fully illustrated, the human element being well represented in the pictures. There is little geography in the strict sense, but the author's descriptions give some insight into the life of the people.

Round Edinburgh by Motor, being Circular Routes between Tay and Tweed. By W. F. Bolton and R. S. Kennedy. Edinburgh: Colstons Ltd., 1914. *Price* 1*s. net.*

This little book gives short notes on twenty-nine motor rounds from Edinburgh, varying in length from about 30 to 143 miles. In connection with each route short descriptive and historical notes are given of the chief objects of interest, but the book does not deal with outings in the ordinary sense of the holiday-maker, for practical details, such as the presence of inns or good picnic-places, the means of viewing historical buildings, possible detours on foot, and so forth, are not included. The book will be especially useful to those who want to take motor runs with the minimum of map study and planning.

AFRICA.

The Sultanate of Bornu. Translated from the German of Dr. A. Schultze, First Lieutenant (retired) Imperial German Army, with Additions and Appendixes by P. Askell Benton, B.A., F.R.G.S., C.C.C. (Oxon.), and a Third Class Resident, Bornu Province, Northern Nigeria. Oxford: University Press, 1913. *Price* 7*s.* 6*d. net.*

In the preface Mr. Benton tells us that he is practically ignorant of German and that his translation has been worried out at odd times by the help of a

dictionary and of one or two bilingual friends. That the result is successful is due to the facts that the translator has an intimate knowledge of the region in question, and that the original contains few flowers of rhetoric. It is in fact a plain, straightforward, and painstaking account of the ancient and powerful empire of Bornu, its history, physical geography, climate, flora and fauna, population, and commercial conditions. The translator's appendices amount to 150 out of the whole book's 400 pages, and thus form a very substantial contribution. They supplement the German work with information mainly about the portion of Bornu which is in British territory. We consider that this composite work is a standard one for the region to the south-west of Lake Chad.

AMERICA.

Bolivia: Its Peoples and its Resources, its Railways, Mines, and Rubber Forests. By Paul Walle. Translated by Bernard Miall. London: T. Fisher Unwin, 1914. *Price* 10*s.* 6*d. net.*

We published here on p. 332 a review of the original issue of M. Walle's book. In translation it has been slightly abbreviated, notably by the omission of the chapter on the ruins of Tiahuanacu, and of those sections of the final chapter which were directly addressed to French readers. An index has been added. The appearance of the volume makes available to a wider public an important work on a country whose resources and prospects have hitherto received an inadequate amount of attention.

With Poor Immigrants to America. By Stephen Graham. London: Macmillan and Co., 1914. *Price* 8*s.* 6*d. net.*

It is almost impossible without copious quotation to give our readers a fair idea of this most fascinating study of the social and industrial conditions which prevail in the America of to-day, amongst the mass of immigrants from various European countries. Mr. Graham deals with the Great Russians, the Little Russians, Slovaks, Poles, Hungarians, Lithuanians, Germans, Scandinavians, Finns, Italians, English, Scottish and Irish who have flocked across the Atlantic in search of a promised land, and who now help to make up that great congeries of nationalities called the United States. Readers of Mr. Graham's *With Russian Pilgrims to Jerusalem* will know to expect vigorous and picturesque descriptions, and they will not be disappointed. It is perhaps well to impress upon stay-at-home people what America of to-day really means, and how far one may be mistaken in visualising it as a country of a homogeneous people. Rather, as M. Bourget pointed out in his famous *Outre-Mer*, it is a collection of diverse countries of which one can only get an idea by dint of much patient toil and travel.

Mr. Graham is true to his early loves, the Russians, and he sets forth for New York in a Cunard steamer, taking his place in the steerage among the Russian immigrants in their sheepskins and with their endless impedimenta of children and household effects. The company was rough and the food not too appetising, but the author seems to have fared wonderfully well on the whole. Arrived in New York he elected to take up his quarters still amongst the working foreigners.

"It seems the Russian who comes to New York is at once grabbed by the existent Social-Democratic organisations, and though he go to church still, he begins to be more and more attached to revolutionism. It is strange that these organisations are directed, not against the Tsar and the officialdom of Russia, but against the Government of the United States and the commercial machine. There is no question of America being a refuge for the persecuted Russian. The latter

is assured at once that America is a place of even worse tyranny than the land he has come from. But if he does not take other people's word he soon comes to that conclusion on his own account. For he finds himself and his brothers working like slaves and drinking themselves to death through sheer boredom, and he finds his sisters in the sweat-shops of the garment-workers, or loses them in houses of evil."

Mr. Graham set off from New York for Chicago in the beginning of May; not in a Pullman car, as he says, but on his own feet, "for in order to understand America it is necessary to go to America, and the only way she can be graciously approached is humbly, on one's feet. I travelled just in the same way as I have done the last four years in Russia—viz. with a knapsack on my back, a staff in my hand, and a pair of stout boots on my feet." It required some courage to face the thousand and odd miles which separate New York from Chicago, cooking his food on the roadside, and sleeping in the open, unless when the weather drove him to seek the shelter of a barn or of an empty wagon in a "freight-train." But this mode of travel enabled Mr. Graham to see both town and country, and to weigh the conditions which obtained for the working immigrant, better than any other and easier method. His own experiences led him to conclude that while America is a land of profuse hospitality for the well-to-do who are furnished with introductions, it is apt to turn a very stony face towards the tramp. He conversed with many wayfarers, and shared his roadside meal with the needy ones. He says, "There is a sort of hermit's charity. It is to have a spirit that is quietly joyful, to be in that state towards man that a gentle woodsman is towards the shy birds that are not afraid of him as he lies on a forest bank and watches them tripping to and from their little nests. Your fellow-man instinctively knows you and trusts you, and he puts aside the mask in which he takes refuge from other fellow-travellers who are alert and busy. I cherish as very precious all the little talks I had with this man and that who came up to me in America."

The above has a Stevensonian ring, and it shows Mr. Graham at his best. He strikes the keynote of his theme in his prologue when he contrasts America, the land of promise and of success, of materialism and the cult of the strong, with Russia the mystical, the pitiful; while midway lies Britain which, in the author's eyes, is "the dying West." "We are an old nation; as far as the little island is concerned hope has died down. . . . . The American working man has a true passion for work, for his country, for everything; the British working man does his duty. We have not the belief in life that the American has—we have not yet the Russian belief in death." He quotes a pamphlet issued by some religious body which says that, "Being an American is a sacred mission,"—it almost savours of Deutsche Kultur)—and this fervent belief may serve to help the American in his strenuous effort to capture his share of the world's trade, though the rampant commercialism which results is not a pleasant feature, as Mr. Graham has frequent occasion to observe.

The book is illustrated with sundry pictures from photographs by the author.

La Géographie de Terre-Neuve. Par ROBERT PERRET. Paris: E. Guilmoto, 1913. *Prix* 10 *francs.*

This comprehensive work has a vigorous preface from the pen of Professor Marcel Dubois, who, in addition to discussing the particular book, devotes some space to the question of the scope of geography, a matter as much disputed in France as it is here. According to him the book is one of the indications that in France geography is reaching the "juste milieu" between an identification with geology and an excessive comprehensiveness. He considers that the author

has solved the problem by taking from the collateral sciences just those results which have a bearing upon human societies in the region under consideration.

In his own introduction the author tells us that he devoted three years to the literature of the subject, in Paris, England, and Canada, and came to the conclusion that the existing books did not set forth the geographical point of view, though they offered much raw material for geography. He completed his studies by a summer passed in the island, when both the civilised regions and the unpeopled solitudes of the interior were visited, and the present book is the result of this long period of preparation. It is a natural result of this method, that, though personal observations are not absent, yet in essence the book is one for reference, and is an extensively "documented" description of the climate, resources, and so forth of the island. The result is to confirm one's conception of Newfoundland as essentially the home of the fishermen engaged on the Banks, and economically not much more. As regards its mineral resources the author believes that, in addition to the iron and copper at present worked, other valuable deposits occur, notably of lead, some of which is argentiferous. Meantime, however, the exploitation of these has been found to present great difficulties, and the poor quality of the coal will always be an obstacle. On this subject the author is even more emphatic than previous writers, and, partly on the basis of an analysis which he had made, states that the Newfoundland product is practically without value either for domestic or industrial purposes. He also lays great stress upon the infertility of the soil, and the climatic drawbacks to agriculture, and disapproves of the recent establishment of pulping mills as likely to lead to a further deterioration of the climate as a result of deforestation.

As regards the fauna, a point of some interest is the statement that so far as the land mammals are concerned Newfoundland is virtually a peninsula, for, with the exception of the reindeer, which cannot move easily over ice, these animals can cross the frozen Strait of Belle Isle in winter. This leads to a curious fluctuation in the mammalian fauna of Newfoundland, for forms which have come from Labrador in winter are unable to return in spring, and, if conditions are favourable, multiply with great rapidity, and then, owing, it is stated, to the limitations of space, fall victims to epidemic disease, which causes their virtual disappearance, after which the cycle recommences by fresh migrations.

These notes may serve to indicate the comprehensive nature of the work. It is, however, greatly to be regretted that, with all his labour, M. Perret has not given adequate attention to the technical details which are so important in a work of reference. His book contains nearly 400 closely printed pages, and there is not only no index, but not even an analytical table of contents. There is an extensive bibliography, but this is unclassified, and the entries are arranged in order of date of appearance, so that the works of the same author are scattered and not in sequence. Finally, there is no adequate modern map, and the very elaborate discussion of the political and economic relations of Newfoundland to the United States is not illustrated by any map at all.

West Indies and Guiana, with Honduras, Bermuda, and the Falklands. Six Lectures prepared for the Visual Instruction Committee. By Algernon E. Aspinall. London: George Philip and Son, 1914. *Price* 8*d. net.*

The Pocket Guide to the West Indies, British Guiana, British Honduras, The Bermudas, The Spanish Main, and the Panama Canal. By Algernon E. Aspinall. London: Duckworth and Co., 1914. *Price* 5*s.*

The Pocket Guide is a new and revised edition of a useful book which has been in existence for some time. It is well illustrated by maps and photographs, and has

already found its public. The present issue has been considerably enlarged, some entirely new chapters having been added, while the text throughout has undergone considerable modification. Mr. Aspinall's other book is sufficiently explained by its title. Slides in illustration of its contents can be obtained by purchase or on hire, the charges in both cases seeming to us somewhat high. The lectures follow similar lines to the guide-book, no special modification of style for the purpose of oral delivery having been made. The pamphlet has some good illustrations, which are identical with certain of the slides, and so give an idea of the characters of these.

AUSTRALASIA.

New Zealand: Its History, Commerce, and Industrial Resources. Compiled by Somerset Playne. Assisted by J. W. Bond and H. H. F. Stockley. Edited by F. Holderness Sale. London: The Foreign and Colonial Compiling and Publishing Co., 1912-13.

This large volume consists of a series of articles on various subjects connected with New Zealand, the pastoral industry receiving special attention. The articles are often of a very detailed nature, thus individual properties are fully described, and there are many photographs of prize animals. In contrast to these sections those dealing with scientific matters, such as the geology, flora, fauna, etc., are short and generalised. The whole book is very copiously illustrated, some of the photographs being very fine. The map, on the other hand, is poor, the printing being almost illegible. While the detailed descriptions of the country are due to members of the editorial staff, who toured through the region for the purpose, the other articles are for the most part written by local experts.

POLAR.

British Antarctic Expedition, 1907-9. *Reports of the Scientific Investigations. Geology.* Vol. I. By Professor T. W. Edgeworth David and Raymond E. Priestley. London: Published for the Expedition by William Heinemann, 1914. *Price* £3, 3*s.*

It is one of the minor drawbacks associated with polar exploration that it is practically never possible to state its scientific results at the time when the public interest is highest. The lectures given by returning members of an expedition, the first books to be written by them, must necessarily alike be devoted chiefly to incident and adventure, to the big events, the tragedies and successes. The result is that there is apt to be left in the public mind a feeling that polar exploration is a form of sport, a training-ground, a means of proving that the high qualities of the race still exist, but not much more. Sir Ernest Shackleton is already entering the polar seas on his second Antarctic Expedition, and the carefully collated results of his first are now just appearing. One has to note, however, that if on the one hand to the general public it seems as though the struggle against adverse conditions were the main thing in such undertakings, on the other hand the reader of the scientific memoirs which are the final result is apt to forget the struggle altogether. It finds no place in this finely illustrated volume; indeed, so thoroughly is it suppressed that every now and again one reads with a sudden shock of recollection a modest apology for uncompleted observations here or there, on account of difficulties with the food supply or of transport. The end of the supreme efforts of the explorers is seen in a perceptible addition to that sum of

reasoned and ordered knowledge which we call science, an addition which has become so impersonal that we are apt to assume while reading the book that the ascent of Erebus or the survey of the Beardmore is a "fine easy job," as the Scottish farmer is said to have remarked of the work of the Geological Survey of the Highlands. The moral of which is, perhaps, that one should strive to read both the narratives and the reports of polar expeditions.

What detailed additions to scientific knowledge does the present volume contain? It has as a sub-title: "Glaciology, Physiography, Stratigraphy, and Tectonic Geology of South Victoria Land," and of the sections devoted to these different subjects probably the glacial one is most important. We have already, thanks to innumerable surveys, a fairly clear idea of three types of glacial activity:—that shown in mountain regions such as the Alps; the Norwegian type; and the Greenland one. The successive expeditions to the vicinity of South Victoria Land are now adding to these a fourth, one which displays many special peculiarities. Professor David and Mr. Priestley include in their descriptions the results of the other expeditions to the region, and there emerges from their admirably illustrated survey a very clear vision of the ice conditions on the western shores of the Ross Sea. We see the great inland ice plateau with its ice divide situated some 180 miles from the coast. We see further how the eastward-moving sheet is dammed back by the coastal mountains, which are breached by huge, wide, flat-bottomed valleys through which the mighty glaciers pass to the Ross Sea, and finally we learn how the tongues of these glaciers, uniting with sea-ice, and covered with drift and precipitation snow, form that unique sheet of ice, formerly of much greater extension, which is somewhat inappropriately called the Great Barrier. We cannot here give details in regard to the various subjects discussed, but may merely mention that the net result of the survey is to cast much light upon the former glaciation of northern Europe.

In regard to the other contents of the volume, we can only call attention to the extremely interesting description of Mount Erebus, and to the discussions of the probable mineral wealth of the Antarctic continent. There seems no reasonable doubt that a vast coalfield exists in the interior, buried deep beneath 1 to 2000 feet of ice, which, the authors state, may in the far distant future be accessible, if deglaciation proceeds far enough! Of more practical importance are the coal seams exposed in the rocks of the coastal mountains. Professor David and Mr. Priestley anticipate that minerals of economic value will probably be discovered in the near future in these mountains, and then these seams may become important. Finally, in regard to the discussion of the tectonics of South Victoria Land, it seems only possible to say at present that further investigation is necessary before certain conclusions can be arrived at, or, in other words, that there is still much left for Sir Ernest Shackleton's new expedition to discover. Perhaps we may add that there is much also to justify the superb confidence which has led his party to set sail for the unknown in a time of supreme crisis for their nation.

GENERAL.

New Light on Drake. A Collection of Documents relating to his Voyage of Circumnavigation, 1577-1580. Translated and edited by Zelia Nuttall. Illustrated by a Map and Plates. London: Printed for the Hakluyt Society, 1914.

Volume 34 of the new series of the Hakluyt Society's publications is, like the others, a monument of research. Mrs. Nuttall has ransacked the archives of

Mexico, Spain, the Vatican, Italy, Paris, and London, studying besides in the British Museum, the Bodleian, and other libraries. It would seem that the last word has now been said about Drake except in the unlooked-for event of the discovery of the private journal, charts, maps, and drawings which were presented by him to Queen Elizabeth, but which have been lost at least since the year 1628. Mrs. Nuttall was fortunate in finding the log-book of Nuño da Silva, Drake's Portuguese pilot. She had it photographed, and with great difficulty transcribed and translated it. This is the only log-book extant of Drake's famous voyage, and it had lain in obscurity for over 300 years. Among other documents examined were depositions of Drake's prisoners, letters and proclamations of the viceroys of Mexico and Peru, and sworn declarations of John Oxenham and other English prisoners who were tried before the Inquisition at Lima. The "new light" resulting from these researches clears Drake from the unworthy aspersions cast upon him not only in Spain but in his own native land. He was no common pirate, but carried with him Queen Elizabeth's written commission giving him instructions and full powers. His captives bear willing witness to his courtesy, and there is full proof that no Spaniards were killed and that only one was injured during the whole voyage. Many ships were captured and some were sunk, but the crews and passengers were always taken off and set ashore at the first convenient opportunity. Perhaps the most important facts discovered are that Drake was instructed by his sovereign to spy out land on the Pacific coast north of the Spanish settlements, that he landed somewhere near the site of San Francisco, and formally took possession in the name of the Queen of the surrounding territory. Apart from such historically valuable conclusions the volume contains much of interest as to the manners of the times, and much light is thrown upon the curious semi-friendly intercourse between Drake and his Spanish captives. We see Drake as a great navigator, a polished man of the world, a beloved captain, a far-seeing statesman, and a very gallant enemy.

Text-book of Topographical and Geographical Surveying. By Colonel C. F. Close, C.M.G., R.E., Director-General of the Ordnance Survey. Revised by Captain E. W. Cox, R.E. Second Edition. Tenth Thousand. London: His Majesty's Stationery Office, 1913. *Price 7s. 6d.*

Colonel Close's volume first appeared in 1905, and rapidly became the standard text-book on the subject in English. The new edition has been very considerably enlarged, though it shows no fundamental alteration of plan, and the plates, which were a special feature of the original edition, have been increased in number. Further, not a few of the original plates have been replaced by new ones, some of which are of great interest. Owing to its entirely technical character, the book cannot be discussed fully in our pages, but we may note that one of the two new plates illustrating the Ordnance Survey maps shows a part of the half-inch to the mile issue, with the new layer colouring. In the text also, the brief account of the layer system has been modified so as to make the commendation of it warmer than in the previous issue. There can, we think, be little doubt that the map-using public is well accustomed to this mode of showng relief, and has learnt to discount the obvious disadvantages—the stepped appearance of the map and so on.

The book in its new form will be cordially welcomed in the centres of higher geographical teaching, as well as by the surveyors for whom it is primarily intended.

Tourist's Guide to the Island of Madeira. Compiled by C. A. LE P. POWER. London: George Philip and Son, 1914. *Price* 3*s.* 6*d. net.*

This is scarcely a guide-book in the ordinary sense, for it gives no general description of the island. It does, however, give notes upon a large number of excursions, and some information in regard to the best modes of getting about and concerning hotels. There is a good general coloured map of the island and two detailed sectional maps. The volume should be useful to those who wish to explore the island thoroughly.

EDUCATIONAL.

A Regional Geography of the Six Continents. Book II. *Asia.* By ELLIS W. HEATON, B.Sc., F.G.S. London: Ralph Holland and Co., 1914. *Price* 9*d.*

Book I., Europe, has already been favourably reviewed. The present book follows the same lines of treatment. The Continent is dealt with under eight sections, covering about 60 pages, of these about 15 pages are, and rightly so, devoted to the Monsoon Lands of the Indian Ocean. Here Climate, Trade and Commerce, Productions—all get their fair share. There are six excellent plates. Mr. Hasellhurst again is responsible for "Questions and Exercises."

A Little Book on Map Projection. By MARY ADAMS. London: George Philip and Son, Ltd., 1914. *Price* 2*s. net.*

The term "Little" is misleading, for, though it may be applicable so far as size is concerned, it fails to give the book justice as regards its comprehensive treatment of the difficult subject of Map Projection. Here we have a volume handy in size, easy to read, intelligible without any great knowledge of mathematics, not costly to purchase. We have accordingly no hesitation in recommending it to all those whom the subject may concern—it is one of the best books of its kind in English.

A Practical Geography. By E. J. ORFORD. London: Sir Isaac Pitman and Sons, Ltd., 1914. *Price* 2*s.* 6*d. net.*

Among the many books dealing with the practical side of geography Mr. Orford's latest work deserves an honourable place, and this mainly because of the freshness of its treatment. Over one-third of the text is devoted to Climate, and the study of maps, climatic and otherwise, occupies a prominent place. Especially suggestive and novel is the Appendix on Handwork.

The New Outlook Geography: The Home of Man. Part III. *America.* By W. C. BROWN, M.A., F.C.P., and P. H. JOHNSON, B.A., L.C.P. *The Home of Man.* Part IV. *Asia.* By L. A. COLES, B.Sc., L.C.P. London: George G. Harrap and Co., 1914. *Price* 1*s.* 9*d.* and 1*s.* 3*d.* respectively.

Both these works are decidedly useful to the teacher of Geography. They belong to what may be called the "statistical" type, as contrasted with the purely "descriptive" type, which seems to be now losing favour. In the former type the pupil is led to see for himself, points are not told or even explained to him. By means of graphs, shaded maps for productions, etc., climate maps, map studies, and comparative diagrams, facts are visualised in the clearest manner. It stands to reason that the pupils, who have, under the guidance of a skilful teacher, gone through the course prescribed under the New Outlook Geography, must obtain a more vivid idea of what geography means than they could have obtained from any other method. We thoroughly recommend the series to teachers.

BOOKS RECEIVED.

The Ancient East. By D. G. Hogarth. (Home University Library. Crown 8vo. Pp. 250. *Price* 1*s. net.* London: Williams and Norgate, 1914.

The History of Scotland. By Professor R. S. Rait. (Home University Library.) Crown 8vo. Pp. 250. *Price* 1*s. net.* London: Williams and Norgate, 1914.

Oil Conquest of the World. By Frederick A. Talbot. Illustrated. Demy 8vo. Pp. v + 310. *Price* 6*s. net.* London: William Heinemann, 1914.

A Woman in China. By Mary Gaunt. With 134 Illustrations. Demy 8vo. Pp. xi + 390. *Price* 15*s. net.* London: T. Werner Laurie, Ltd., 1914.

The Atlas Geographies. By Thomas Franklin and Ernest R. Shearmur, B.Sc. (Lond.). Part iv. *Commercial Atlas Geography.* 4to. Pp. v + 232. *Price* 3*s. net.* Edinburgh: W. and A. K. Johnston, Ltd., 1914.

On the Trail of the Opium Poppy: A Narrative of Travel in the chief Opium-producing Province of China. By Sir Alexander Hosie, M.A., LL.D., F.R.G.S. 2 vols. Demy 8vo. Pp. (vol. i.) viii + 300; (vol. ii.) v + 308. *Price* 25*s. net* complete. London: George Philip and Son, 1914.

The City of Dancing Dervishes: And other Sketches and Studies from the Near East. By Harry Charles Lukach. Illustrated. Crown 8vo. Pp. xii + 254. *Price* 7*s.* 6*d. net.* London: Macmillan and Co., Ltd., 1914.

Through the Grand Canyon from Wyoming to Mexico. By E. L. Kolb. With a Foreword by Owen Wister. With 48 Plates from Photographs. Crown 8vo. Pp. 344. *Price* 8*s.* 6*d. net.* New York: Macmillan and Co., 1914.

With the Bible in Brazil. By Frederick C. Glass. With a Foreword by Rev. J. Stuart Holden, M.A. Crown 8vo. Pp. xii + 164. *Price* 2*s.* 6*d. net.* London: Morgan and Scott, Ltd., 1914.

History of Upper Assam, Upper Burmah, and North-Eastern Frontier. By Col. L. W. Shakespear. Demy 8vo. Pp. xx + 272. *Price* 10*s. net.* London: Macmillan and Co., Ltd., 1914.

Fighting in Flanders. By E. Alexander Powell. With Illustrations from Photographs by Mr. Donald Thompson. Crown 8vo. Pp. xix + 227. *Price* 3*s.* 6*d. net.* London: William Heinemann, 1914.

Who's Who? 1915: *An Annual Biographical Dictionary, with which is incorporated Men and Women of the Time.* Sixty-seventh year of issue. *Price* 10*s. net.* London: Adam and Charles Black, 1914.

Through the Brazilian Wilderness. By Theodore Roosevelt. With Illustrations from Photographs by Kermit Roosevelt and other Members of the Expedition. Demy 8vo. Pp. ix + 374. *Price* 18*s. net.* London: John Murray, 1914.

The Excavations at Babylon. By Robert Koldewey. Translated by Agnes S. Johns. With 255 Illustrations and Plans. Medium 8vo. Pp. xix + 335. *Price* 21*s. net.* London: Macmillan and Co., Ltd., 1914.

Einige Bemerkungen über das Klima der Historischen Zeit. Von Arnold Norlind. Pp. 53. Leipzig, 1914.

Diplomatic and Consular Reports.—Trade of Bavaria (5394).

Colonial Reports (Annual).—Falkland Islands (817); Trinidad and Tobago (819); Jamaica (820).

Publishers forwarding books for review will greatly oblige by marking the **price** *in clear figures, especially in the case of foreign books.*

THE SCOTTISH

GEOGRAPHICAL

MAGAZINE.

LAND FORMS AND LANDSCAPES.[1]

By J. D. Falconer, M.A., D.Sc., Lecturer in Geography in the University of Glasgow.

(With Illustrations.)

I. The Origin of Relief.

Curiosity as to the origin of the major features of the earth's surface was aroused at an early date. The wise men of the east all had their theories, more or less fantastic, about the origin and history of the world, but to the Greeks alone was it given to make any real progress towards the truth. It is a remarkable fact that before the destruction of the Republic the Greek philosophers were clearly advancing towards an interpretation of the surface features of the earth, which was not rediscovered until two thousand years later. There is little doubt that had the indigenous culture of classic Greece been spared, scientific thought would not have been eclipsed as it was during the early and middle ages of the Christian era. And it is an equally remarkable fact that the earlier as well as the later birth of geological science took place in countries which are essentially similar in physical characteristics. The keynote of Greece, as of Great Britain, is variety, variety of climate, variety of topography, variety of structure; and it was this variety and the contrasts which variety implies, which, in both countries, first awoke the spirit of scientific inquiry.

Living in the midst of very varied scenery, and within easy reach of other lands whose scenery contrasted widely with their own, the Greek philosophers were impelled to speculate upon the origin of relief. When they saw volcanic islands appearing and disappearing in the Ægean Sea,

[1] Abstract of a course of lectures on Land Forms and Landscapes, delivered at the British Museum, London, Nov.-Dec. 1914.

and felt the heavings of Mother Earth in the throes of earthquake shocks, it is little wonder that they should have guessed that the major features of surface relief are due to sub-surface causes, to forces located within the interior of the earth itself. And as after rains and winter snows they gazed upon the torrents carrying sand and silt and gravel from the mountains to the seas, and watched them cutting deep gorges into the flanks of the hills, it is little wonder that they began to speculate upon a time when the present mountains would be levelled to the sea, and the surface of the earth reborn by a great crustal revolution. According to the tenets of the Pythagorean school, "Solid land has been converted into sea and sea has been changed into land. Plains have been submerged by earthquakes and upheaved into hills by the confined air seeking vent. Valleys have been excavated by running water, and floods have washed down hills into the sea. Islands have been connected with the mainland by the growth of deltas, and peninsulas have become islands, the sea having carried away the isthmus between them and the mainland." It was Aristotle who wrote the oft-quoted phrases, "The distribution of land and sea in particular regions does not endure throughout all time, but it becomes sea in those parts where it was land, and again it becomes land in those parts where it was sea, and there is reason for thinking that these changes take place according to a certain system and within a certain period. The changes, however, are so slow in comparison with the duration of our lives that they are commonly overlooked."[1]

It is evident, as Lyell remarked, that many of the Greek philosophers considered that the agents of change now operating in nature were capable of bringing about in the lapse of ages a complete revolution in the character of the surface of the earth. Others, however, believed that with each successive return of the Annus Magnus, at the close of a cycle of comparative repose, the whole surface of the earth was overwhelmed in a great catastrophe, and a new world arose out of the ruins of the old. Thus early in the history of natural science was the line drawn between the doctrines of catastrophism and uniformitarianism!

The philosophers of the Augustan Age accepted the hypotheses of the Greeks, but after the fall of the Empire came that eclipse of scientific speculation which was largely due to the insistence by the Church upon the literal interpretation of the Biblical narrative. Up to the sixteenth century, it was the general belief of the Christian world that the origin of the earth was not more remote than a few thousand years, and that since the creation the flood was the only great catastrophe by which considerable change had been wrought on the earth's surface. All fossiliferous rocks had been deposited during the flood, and to the action of the waves, washing backwards and forwards over the surface, were to be ascribed all the minor features of the topography. After the sixteenth century, however, opinion gradually became more liberal, and was largely influenced at first by the speculations of the classical authors. Heated controversies arose with regard to the central points of the

[1] Lyell's *Principles of Geology*, 10th ed., vol. i. pp. 17-21.

ancient theories, as to the relative effect upon the surface of the earth of earthquake and volcanic action, of the action of rain, river, and sea, and as to the possibility and probability of successive periods of catastrophe and repose. Hooke (1668) believed that the larger features of relief were to be ascribed mainly to the action of earthquakes, "which have turned plains into mountains and mountains into plains, seas into land and land into seas, made rivers where there were none before, and swallowed up others that formerly were."[1] Moro and Generelli, Italian geologists (1740-49), believed that while mountains in one part of the earth were being slowly reduced by the action of torrent, stream, and sea, new mountains were elsewhere being elevated above the sea by earthquake and volcanic action, and that the wastage of the solid land was thus being steadily balanced by the elevation of the sea floor.[2] On the other hand, Hutton (1788), the father of Scottish geology, believed that the relief of the continents was being slowly destroyed by the action of rain and running water, that the mountains were being literally but imperceptibly cast into the sea, and that when the rivers had thus furnished materials for new continents, the world would be reborn by a violent convulsion. "He required alternate periods of general disturbance and repose: and such he believed had been and would for ever be the course of nature."[3]

Towards the close of the eighteenth century it began to be realised that much of the current geological theory was merely speculation from insufficient data. In 1807 the Geological Society of London was founded for the purpose of making and recording accurate observations of geological interest, with the intention of providing in this way a sure foundation of fact for future generalisation, and with the publication in 1830 of Sir Charles Lyell's *Principles of Geology* came the first attempt to elaborate a sound system of geology upon a scientific basis. In his theory of the earth Lyell held that there was no direct evidence of the general crustal convulsions which had been said to occur. On the other hand, he believed that given a sufficient length of time, the forces at present active upon and within the crust of the earth were quite powerful enough to account for all natural phenomena. He brought forward evidence to prove that the surface of the earth was at the present day undergoing movements of elevation and depression, in places rising above and in places sinking below the level of the sea. He classified these movements into two types, (1) relatively rapid movements, occurring in regions affected by volcanic and earthquake activity, and (2) slow movements occurring in regions unaffected by volcanic activity at the present day. Of the former, he took as example the observed oscillations of level of the shores of the Bay of Baiae. The remaining columns of the ruined Temple of Serapis (Fig. 1), whose floor is now washed by the sea at high water, have been bored by marine bivalves at a height of about twenty feet above their foundations.

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[1] Lyell's *Principles of Geology*, 10th ed., vol. i. p. 43. [2] *Ibid.* p. 51.

[3] *Ibid.* p. 73. Lyell was, however, much more indebted to Hutton than he acknowledged in his *Principles*.

This shows that since the temple was built the shores of the bay have suffered first a submergence and then an emergence, to the extent of about twenty feet. Lyell connected these phenomena with the volcanic activity of the neighbourhood, and suggested "that when the subterranean heat is on the increase, and when lava is forming without obtaining an easy vent, the incumbent surface may be uplifted: but when the heated rocks below are cooling and contracting, and sheets of lava are slowly consolidating and diminishing in volume, then the incumbent land may subside."[1]

Of the second class of movements Lyell took as examples the ascertained unequal elevation in recent times of the shores of Sweden and a similar gradual depression or subsidence of the shores of Greenland.

Photo by the late Dr. Tempest Anderson.

FIG. 1.—The Temple of Serapis.

He called attention also to the occurrence of raised beaches (Figs. 2, 3) and submerged forests round our own shores. He ascribed these regional movements to the action of what he termed "the subterranean forces," but beyond suggesting that these forces were probably connected with the development of subterranean heat, he was chary of indulging in any precise definition of their ultimate character. "Whether we ascribe these changes," he wrote, "to the expansion of solid matter exposed to hydrothermal action, or to the melting of rock, or to the solidification of mineral masses, in whatever conjectures we indulge, we cannot doubt that at some unknown depths the structure of our globe is undergoing very important modifications."[2]

Lyell was well aware that although over wide areas of the surface the

[1] Lyell's *Principles of Geology*, 10th ed., vol. ii. p. 178.

[2] *Ibid.* p. 197.

rocks are found in horizontal series, as if the floor of the sea had suffered only a varying degree of vertical elevation, yet in other areas the rocks are tilted at various angles, in others bent into arches and troughs, in yet others minutely folded and crumpled. He accepted Sir James Hall's experimental demonstration that these phenomena were due to the incidence of lateral pressure, and he suggested that the subterranean forces might manifest themselves not only in vertical movements, but also directly or indirectly in lateral movements. Much of the bending of pliant strata might have been occasioned by the packing of the same into a smaller space in the course of a downward movement. In other cases

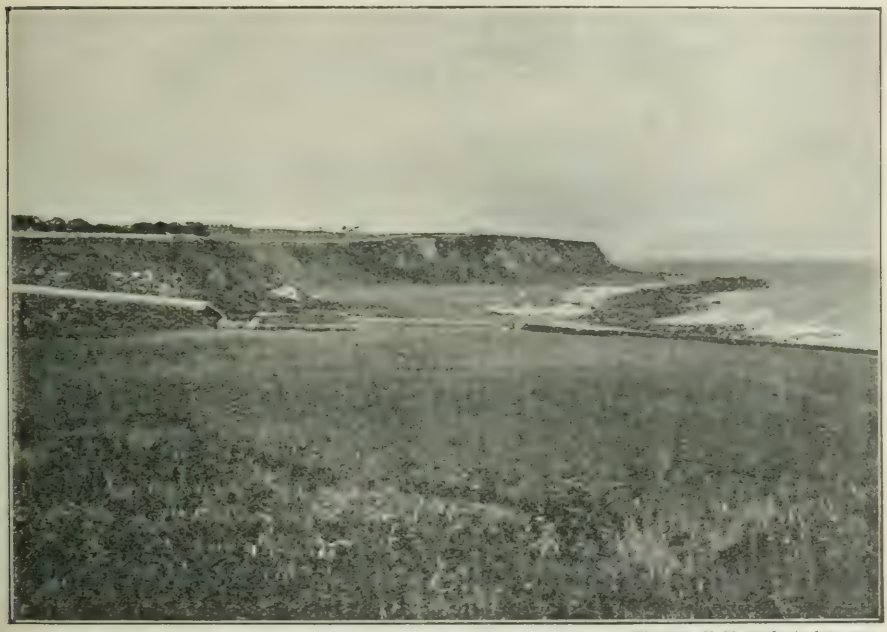

Photo by H.M. Geological Survey.

FIG. 2.—15 ft. raised beach and old sea cliffs. Near Hilton of Cadboll, East Ross.

the observed folding and crumpling of the rocks might be due to expansion by heat in a confined space as the result of the intrusion of igneous material, or to changes of volume consequent upon thermal metamorphism. He believed that in any given region the subterranean forces had exhibited in the past frequent variations in the intensity of their activity, and that periods of relative disturbance and repose had followed each other in succession in every region of the globe as part of the uniform course of nature. He refused to recognise the doctrine of alternate periods of crustal disturbance and repose, as advocated by so many of his predecessors. On the contrary he held that, while the sum total of crustal energy remained the same, the subterranean forces were confined in activity for a cycle of years to large but determinate spaces, and that

they then "gradually shifted their position so that another region which had for ages been at repose became in its turn the grand theatre of action."[1] Without hazarding any speculation about the early history of the earth, he believed that the relief of the globe had originated through and was maintained by the activity of those forces whose existence could be demonstrated at the present day, that mountain chains, plateaus, and ocean basins had been repeatedly formed throughout

Photo by H.M. Geological Survey.

FIG. 3.—100 ft. raised beach and old sea cliffs. Near Rudha Mhail Lighthouse, N. Islay.

geological time by the unequal elevation or depression of belts or regions of the earth's surface, the rocks being variously bent, tilted, folded, and crumpled during the process.

In 1833 Elie de Beaumont put forward his theory of the earth in which he reasserted the doctrine of alternate periods of general crustal convulsion and of comparative repose. According to him, at each of the periods of convulsion or "revolution" of the earth's surface a number of mountain chains were formed, frequently widely separated from each

[1] Lyell's *Principles*, 10th ed., vol. i. p. 78.

other, but all having approximately the same general direction or strike, while the mountains thrown up at different periods had for the most part different directions. He believed that there had been a recurrence of these paroxysmal movements from the remotest geological periods, and that such periods of disturbance could not be referred to the activity of forces now active, but were probably periodic phenomena dependent upon the secular refrigeration of the heated interior of the earth.

Lyell criticised this doctrine in his *Principles*, and pointed out that the mere parallelism of mountain chains was no proof of their contemporaneous origin, and that even the occurrence of the same formations in different mountain chains was in itself a proof, not of contemporaneous elevation, but only of homotaxial accumulation. Lyell also steadily refused to accept the suggestion that the earth is composed of a cooling and shrinking interior and a settling crust. He regarded this as an hypothesis incapable of being demonstrated. To the last he retained his sense of perspective and repeatedly dwelt upon the futility of mere conjecture. In the last edition of his text-book he retained his old phrase, "the action of subterranean forces," and his philosophic attitude is now proved to have been abundantly justified.

No sooner, however, was his guiding hand removed than his successors adopted in full that very suggestion which he had refused to accept. It was agreed that all crustal movements, both vertical and tangential, with their accompanying phenomena of elevation and depression and lateral compression and tension of the surface, were to be ascribed entirely to forces generated during the settling of the cold outer crust or shell upon the cooling and shrinking interior. It was also agreed that owing to the contraction of the nucleus, subsidence or downward movement would be the general rule, although every subsidence would probably be accompanied by differential upheavals of a more limited kind. Upon these assumptions an hypothesis of relief was worked out in considerable detail which is still very generally accepted.

It is supposed that in the course of cooling from a gaseous condition there would come a time when the earth would consist of a molten and highly heated interior surrounded by various lighter and cooler envelopes, respectively the barysphere, the lithosphere, the hydrosphere, and the atmosphere. With continued cooling it would become necessary for the lithosphere or crust of the earth to adapt itself in some way to the shrinking interior. So long as the crust was thin, it would adjust itself to the compressional strain by wrinkling or shrivelling all over the surface, as the skin of an apple adjusts itself to a lessening core. A time would come, however, when the crust would become thick enough and rigid enough to resist such wholesale shrivelling. Adjustment would then be sought in the excessive downward movement or sagging of the larger and presumably heavier portions or segments of the crust, the saglines being either lines of flexure or lines of actual fracture. As the result of the sagging of these major or master segments, the minor segments between them would be exposed to considerable compressional strain, which would lead to their being squeezed upward and outward relatively to the major segments, the upward movement being probably in part induced an

supported by a sub-crustal flow of plastic material under hydrostatic pressure. The hydrosphere, or waters of the surface, would be collected into the great hollows of the lithosphere thus formed, while the minor segments would appear as land masses above the surface of the waters. In this way the oceanic basins and the continental plateaus would be originally outlined and the dry land separated from the sea.

Again, a time would come when the relief gained by simple vertical movements of this kind would be insufficient to relieve the pressure of

Photo by H.M. Geological Survey.

FIG. 4.—Inclined thrust-plane bared by denudation.
Near Inchnadamff, Sutherlandshire.

the great master segments upon the minor or squeezed segments. The surface of the latter would be arched or warped and the rocks below variously bent and flexured. As the strain increased, further relief would be found by the subsurface rocks becoming buckled, crumpled, folded, and displaced upward as fold mountains along certain definite lines of weakness, of which the most important would be the unstable or labile zones or belts which separate continents and oceans. The more superficial rocks, on the other hand, would find relief in tangential movements, whereby slices of the crust would be cut off and driven

forward at low angles along thrust planes for considerable distances, as demonstrated in the north of Scotland. (Figs. 4, 5.) The two movements would usually occur together in the same belt or zone of weakness, and be accompanied or followed by the general elevation of the whole region under compressional strain and hydrostatic pressure to form a highly complex belt of mountains. The gaining of relief along such axial lines would naturally relieve the strain elsewhere. Tensional in place of compressional strains would affect wide areas of the surface. Joints and cracks in the rocks would tend to gape. Great rifts would appear on the surface, and vertical movements would take place along many of them. Blocks of the crust thus defined would begin to adjust themselves to the new conditions mainly by downward settling, although it is conceivable that in the course of these movements certain of the smaller blocks might suffer a differential elevation by being squeezed up between larger blocks. Certain blocks might also be tilted at various angles by unequal movements, while the surfaces of others might be arched or warped in various ways. The final result would be that plateaus and plains, ridges and scarps, terraces and troughs would be formed on the surface of both the major and the minor segments, that is, on the continental segments as well as on the ocean floor. Relaxation of pressure, with the resulting opening of joints and the formation of fracture and fault lines, would also have the effect of allowing molten material beneath the surface to escape upward. Volcanic cones would be formed on the surface, and sheets of lava would be spread out over the crust. In this way the face of the earth would be fitted out with a certain original or primary relief, directly due to the action of forces generated during the cooling and contraction of the earth's interior.

The irregular surface thus produced would be attacked by the agents of superficial denudation and variously sculptured into a variety of secondary forms. In time the original relief would be destroyed and mountains and plateaus alike reduced to a monotonous undulating surface. Obviously, therefore, it is necessary that the forces responsible for the production of the original irregularities of the surface should continue to maintain the relief of the earth's crust throughout geological time. There is, however, considerable difference of opinion as to the exact method by which this result has been achieved. Some adopt the uniformitarian attitude, so ably advocated by Lyell, and urge that the crust of the earth is very unstable and is constantly undergoing adjustment to the shrinking interior, that continent and mountain building is going on as continually and imperceptibly as the cooling and contraction of the earth itself, and that the radial and tangential forces developed may suffer a recurrent intensification of their activity in any one region, while the locus of their more intense activity may be constantly moving from place to place in the course of geological time.

Others, however, who may be termed the modern catastrophists or periodists, believe that the crust of the earth would become in time sufficiently rigid to resist any continuous and complete adjustment to the lessening interior, that strains and stresses would gradually accumulate in the crust during long periods of comparative repose until they

overcame the rigidity of the lithosphere, and gave rise to shorter periods of general crustal disturbance, during which the face of the earth would be to a considerable extent remodelled and its relief rejuvenated by the formation of new mountains, plateaus and plains. A periodic alternation of general crustal disturbance and repose has been, according to them, the normal course of nature from the beginning of the geological record.

The criticisms of physicists, however, have aroused grave doubts (1) as to the former gaseous and liquid conditions of the earth as required by the commonly accepted version of the nebular hypothesis, (2) as to the liquid or nearly liquid condition of the interior at the present day,

Photo by H.M. Geological Survey.

FIG. 5.—North face of Sgurr Ruadh, Ross-shire, with thrust-planes marked by white lines.

and (3) as to the possibility of a relatively thin crust over a shrinking interior becoming rigid enough to accumulate the strains and stresses required for the periodical disturbances of the catastrophic hypothesis of the maintenance of relief. These criticisms do not materially affect the position of the uniformitarians, who, so long as a cooling and contracting globe is postulated, are willing to adopt any view of the constitution of the earth's interior, whether liquid, partially liquid, or solid, which may be acceptable to physicists. They have led, however, to the setting up of the nebular hypothesis in a new form, according to which it is suggested that the earth has not passed through the commonly accepted gaseous and liquid stages, but has been slowly built up by the aggregation of minute cold planetary bodies or planetesimals of varied mineral composition.[1] It is supposed that internal heat was gradually

[1] Chamberlain and Salisbury's *Geology*, vol. ii. p. 38.

developed by the compression of the interior as the earth slowly grew in size, and that in time the heat became sufficient to melt the more fusible constituents which were extruded towards the surface, while the core became denser and remained solid under pressure. With increasing mass water vapour and other atmospheric gases would be attracted to form an outer envelope. The surface of the globe would naturally be somewhat irregular owing to irregular accretion, and after condensation the hydrosphere would begin to fill up the hollows on the surface. The portions projecting above the water would have their density diminished by weathering and by the leaching out of certain mineral constituents, while the portions of the surface beneath the waters of the ocean would not only be protected from loss of density by weathering but would even gain in density by the accumulation of material derived from the land. Additional planetesimals would respectively retain, or suffer a diminution of, their specific gravity according as they fell upon water or land areas. In this way a distinction would be gradually drawn between the heavier oceanic segments and the lighter continental segments. When accretion stopped, the development of heat by simple compression would cease and the temperature of the interior would begin to fall. This loss of heat coupled with molecular rearrangement of material in the interior would cause a general shrinkage. The oceanic sectors would shrink radially and crowd upon the adjacent sub-continental sectors to the extent of causing a relative increase in elevation at the surface sufficient to give rise to the formation of plateaus. The crust, on the other hand, not having undergone the molecular and thermal changes which affected the interior, and hence not having shrunk proportionally to it, is supposed to have accommodated itself to the shrunken interior by folding and thrusting above a postulated shear-zone, calculated to lie at a depth of three to five miles below the surface.

This hypothesis of the early history of the earth and the present character of the interior is believed to meet many of the objections advanced by physicists against the earlier hypothesis, and is also capable of being accepted by either uniformitarians or periodists. Gradually, however, and especially since the discovery of radium, many workers have begun to realise the force of the objections originally advanced by Lyell[1] to the fundamental assumptions of the contraction theory that the interior of the earth is slowly cooling, and also slowly shrinking, and with the realisation of the undemonstrable character of these assumptions has come a disposition to discredit the whole contraction theory and its superstructure of hypothesis.

Meanwhile, however, a new theory of the earth has been slowly developing, and has incorporated the doctrine of isostasy. The researches of Colonel Burrard showed that, on the plains of India, the plumb line does not suffer its complete theoretical deflection due to the projecting mass of the Himalayas to the north, but seems to be attracted southward to an appreciable extent by the peninsula of India. He concluded

[1] Lyell's *Principles*, 10th ed., vol. ii. p. 213.

that the earthblock forming the peninsula has a greater density than the earth block forming the Himalayas, and that the lessened density of the latter appears to be accompanied by an increase of bulk which makes it project at the surface. Similar results were obtained in other parts of the world, especially in America. Upon these conclusions was based the hypothesis that high blocks were high because they were light, and low blocks were low because they were heavy. Certain other observations were brought forward to support an extension of this hypothesis. "The incoming of the tide, for example, adds the extra weight of a large body of water upon the shore, and it is believed that the pressure of this water causes the western coast of Ireland to sink about three inches every tide, the ground rising again when the tide recedes and the load is removed. One inch of rain falling upon a square mile of country places upon it a weight of 60,000 tons of water; and according to the late Professor Milne, a heavy storm of rain on the western side of Japan causes the ground to sink, but it rises again as the water runs off or is removed by evaporation."[1] The assumption was accordingly made that the crustal blocks are so nicely balanced that changes of surface load are at once reflected in vertical movements of the blocks themselves.

The theory of the earth into which these observations and conclusions were fitted, and which is commonly known as the theory of isostasy, in its original form postulated the existence of a liquid or nearly liquid layer beneath the solid shell. It was supposed that at some definite level beneath the surface, 76 miles in the case of the United States, a plane of complete compensation existed which would support crustal blocks of equal weight, regardless of their density, the lighter and bulkier blocks projecting above the heavier and more compact. It was supposed also that the earth in the course of its history has been steadily striving after the attainment of complete isostatic equilibrium of this kind, an ideal however which has never been realised owing to the fact that through the action of the superficial agents of denudation, transference of material is continually in progress at the surface from the lighter and higher blocks to the lower and heavier. This transference of surface material would disturb the equilibrium. The heavy blocks would tend to sink and cause a sub-crustal flow of material which would buoy up the lighter blocks to the neighbourhood of their original level, and thus compensate them both in mass and in elevation for the material removed from their surface. As, however, complete compensation would result only in the preservation of the *status quo*, it is suggested that the compensation is never complete owing to the rigidity of the crust, and that strains and stresses consequent upon transference of load and tending towards vertical and lateral displacement would gradually accumulate in the crust until they overcome the rigidity of the rocks, and find relief in either local or general crustal disturbance, after which the various blocks would arrange themselves as far as possible according to density, the lighter again higher, the heavier lower.

There is, however, no proof that either under or over compensation

[1] Gregory's *Geography*, p. 41.

takes place instead of complete compensation, and it is very doubtful whether the suggested small differences in compensation could give rise to any appreciable amount of lateral strain. It would appear, therefore, that isostatic compensation, if it exists at all, can be only a very subsidiary cause of crustal deformation, and that the doctrine of isostasy in this form, which postulates a liquid layer beneath the crust, might profitably be combined with the contraction theory of the earth, although it would be subject with it to the same fundamental objections.

The theory of isostasy in another form, which also seeks a source of competent lateral strain, independent of contraction, is therefore preferred in some quarters. Radio-activity is suggested as quite a sufficient explanation of the internal heat of the earth.[1] The interior is taken to be sufficiently plastic under pressure to allow of the occurrence of vertical movements, with addition or removal of surface load, and the distinction between light and heavy crustal blocks is taken as demonstrated. The light blocks, however, are considered to be high, not because they are light, but because they are weak, and have been squeezed up into their present positions by compression between two lower and heavier blocks. Isostasy is defined as "that condition of form to which the force of gravitation tends to restore planetary bodies, whether homogeneous or not. Every body in a condition of rotation about an axis must possess a form of equilibrium, and until this equilibrium is attained, strains are set up and deformation occurs. When this state is reached, if the distribution of matter remains unchanged, no alteration of form will occur."[2] In the case of the earth, however, transference of load on the surface gives rise to a redistribution of mass and a disturbance in the form of equilibrium. The various segments undergo relative displacement, deformation follows, and the weaker zones, determined mainly by sedimentation, but with radiothermal activity as a subordinate cause, become squeezed, compressed, and displaced upwards. These movements take place irrespective of the early history of the earth, which is probably solid throughout, and they are capable of being fitted into either a uniformitarian or a periodic scheme of crustal evolution.

The theory of isostasy in this form is ingenious but vague, and rests mainly upon a foundation of hypothesis. It is unfortunately dependent, like the earlier version of the isostatic doctrine, upon the conception of the vertical movement of crustal blocks with increase or decrease of surface load. It is an old suggestion, but one that has never been proved, that the slow accumulation of sediment is the cause of the slow sinking of the floor over which the material is spread.[3] The alleged proofs already quoted, of the rising and sinking of the crust with decrease or increase of load, may be nothing but evidence of the resiliency of the outer loose and fractured layers of the earth's surface; and with a solid globe possessing a rigidity greater than that of steel as required by

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[1] Joly's *Radioactivity and Geology*, p. 154.
[2] Lake and Rastall's *Text-book of Geology*, 1913, p. 194.
[3] Geikie's *Text-book of Geology*, vol. i. p. 396.

physicists, it is difficult to believe without better proof that the stability of the surface can be so easily affected by transference of surface load. On the other hand, if it be assumed that the formation of a long narrow geosynclinal trough, filled with sedimentary material, is sufficient to upset the rotational equilibrium of a globe with a radius of four thousand miles, there is no reason why the theory of isostasy in this form should not be combined with the older contraction theory, the shrinking of the interior being postulated as the primary cause of the formation of the geosynclinals. Indeed some supporters of the planetesimal hypothesis and the theory of isostasy have urged that the contraction of the interior and the disturbance of rotational equilibrium are together responsible not only for the compression and elevation of the weaker segments of the crust, but also for a relative movement of translation of certain segments from east to west above the postulated zone of flow. The crowding of the segments thus induced would cause folding and buckling of the weaker zones, especially on the western margins of the continents.[1] Such a reconciliation of opposed views, however, requires the acceptance of the fundamental hypothesis of both.

It has also been suggested that the recurrent rejuvenation of relief amongst other things may be due to a periodic change in the position of the earth's axis of rotation, each change being accompanied by a period of crustal disturbance and a change in the form of the earth itself.[2] As no sufficient reason, however, can be advanced for the probability of any such change, the hypothesis may be dismissed without further consideration.

It is obvious that none of the hypotheses which we have discussed gives us much assistance in assigning the recognised facts and forces of crustal deformation to their ultimate causes. To say that the primary relief of the earth's surface is the result of the striving after equilibrium of a rotating body, or is the result of a general settling of the crust upon a shrinking interior, takes us little further towards the truth than if we should say that the primary relief of the earth's surface is the result of the activity of subterranean forces. We are forced to fall back upon the facts which have been demonstrated. The existence of radial forces has been demonstrated, as the result of whose activity crustal blocks undergo movements of relative elevation and depression. Similarly the existence of tangential forces has been demonstrated by which crustal blocks undergo great compressional and tensional strain. These forces may occur singly or together, and there is good evidence in the geological record of a recurrent intensification of their activity in any one region; but beyond this we enter the realm of hypothesis. In what relation the radial forces stand to the tangential we do not know, and it is most unlikely that we should know, when we consider how limited is our field of investigation and how little investigation has yet been carried out in our limited field. We must be careful not to lose our sense of perspective nor accept and teach mere conjecture as matter of fact. It

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[1] Gregory's *Fiords*. 1914, ch. xxv.

[2] Tarr's *College Physiography*, 1914, p. 621.

is wiser to keep an open mind, to accept as demonstrated none of the professed hypotheses of explanation, but meanwhile to assign the origin of the primary relief of the surface of the earth, as Hutton and Lyell assigned it, simply to the action of great subterranean dynamic forces which manifest themselves in certain demonstrated directions, and appear to suffer a recurrent intensification of their activity, but of whose origin and intimate character we can hazard nothing but pure conjecture.

(To be continued.)

THE RAINFALL OF THE COTTON BELT OF THE UNITED STATES AND ITS RESULTS.[1]

By B. C. Wallis.

(With Illustrations.)

1. The Rainfall Conditions.

The rainfall of the cotton belt of the United States may be examined in regard to both the total annual precipitation and the average monthly intensity of the rainfall as indicated by pluviometric coefficients. The data for such an investigation are published in Bulletin "W" issued by the United States Weather Bureau. The rainfall values there tabulated for places where the observations have been made over a series of at least twelve years have been examined, and it is found, on the average, that the annual precipitation for the States is respectively in inches :— North Carolina 50, South Carolina 49, Georgia 52, Alabama 51, Mississippi 53, Florida 54, Louisiana 54, Texas 31, Arkansas 48, and Oklahoma 34. Pluviometric coefficients have been calculated and used to make the equipluve maps, Figs. 1 and 2.

From these maps it may be inferred that the pluviometric gradient runs approximately from the south-east to the north-west, for the equipluves and belts of similar rainfall intensity lie, in general, along a north-east south-west line. In an area which is roughly continuous with the State of Mississippi, the rainfall intensity is usually above or below the rainfall intensity on each side, so that the pluviometric gradient is either high or low at the ends. Roughly, therefore, there are three rainfall regions in the cotton belt, one near the coast similar to another in the north-west, and a central region of a different type of rainfall. In the western continental region the pluviometric range rises from "under 33" to "over 200" and is, roughly, 200, *i.e.* about one-sixth of the total annual precipitation. In the coastal region towards the east and south-east the range is approximately 133, *i.e.* about one-ninth of the annual rainfall. In the central region the range is but 66, equal to an eighteenth of the year's rain. In relation to the latitude, 25° N. to 37° N. of the cotton

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[1] Cf. Vol. xxx. p. 582.

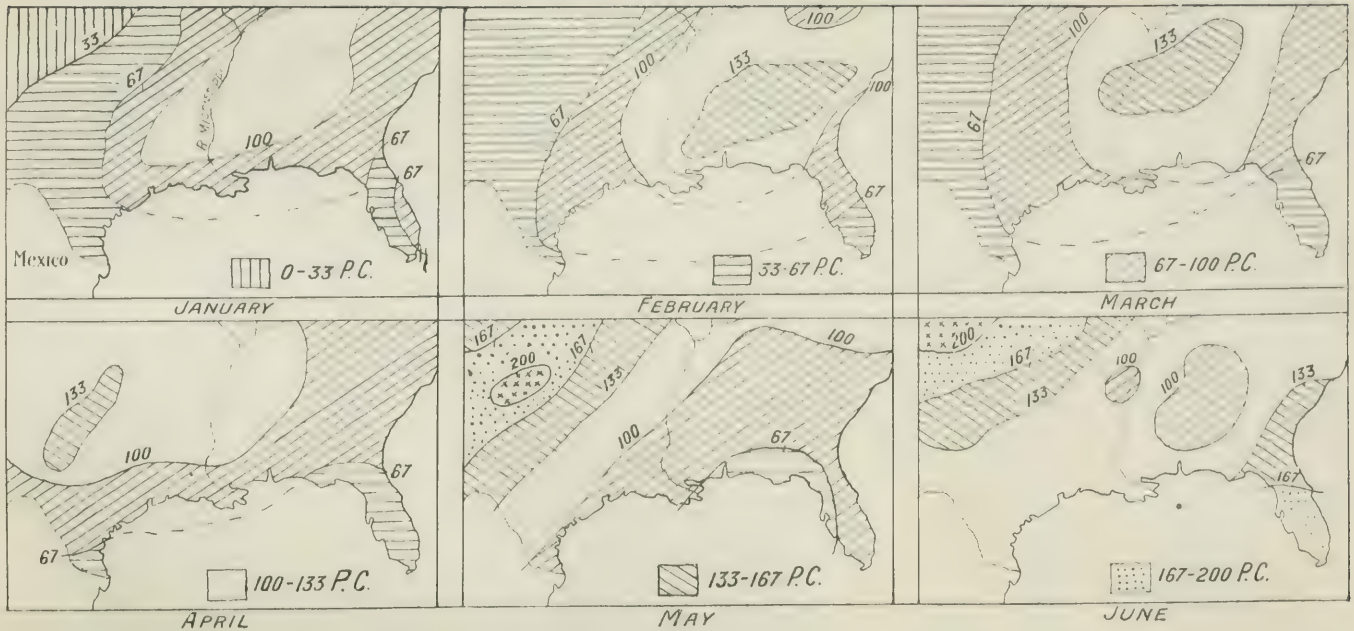


Fig. 1.—The distribution of Rainfall Intensity in the Cotton Belt.

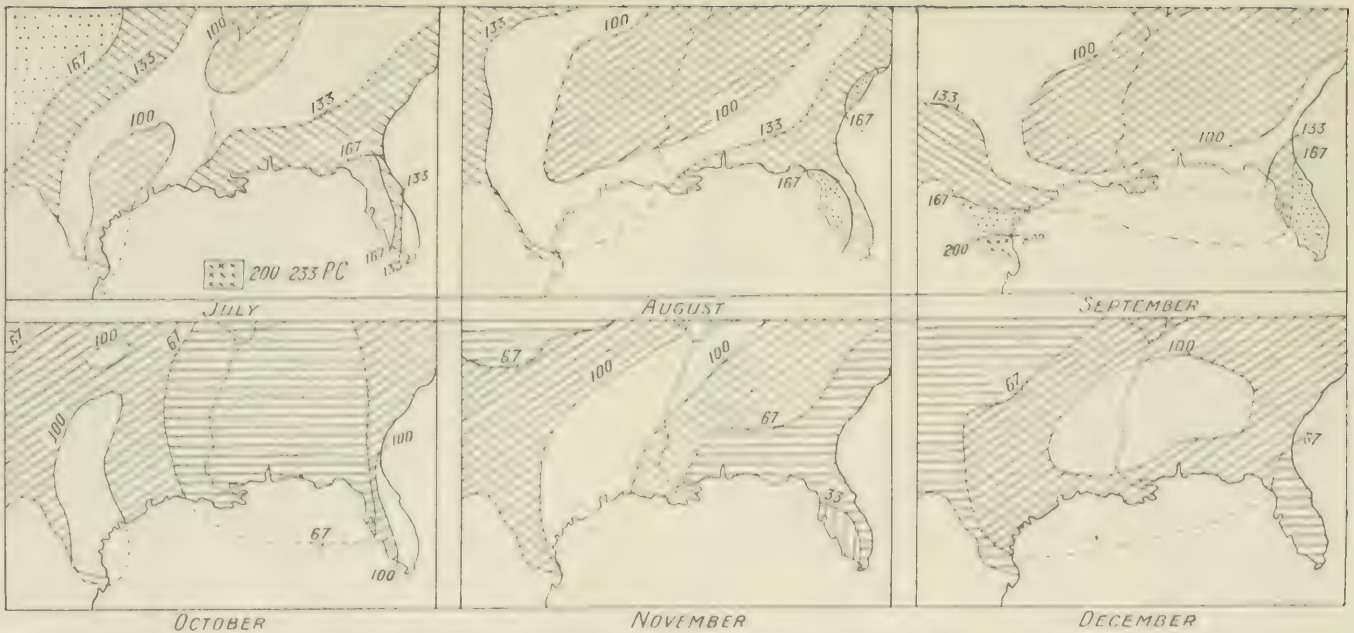


FIG. 2.—The distribution of Rainfall Intensity in the Cotton Belt.

belt, it is noteworthy that the pluviometric range of the two outside regions is similar in amount, though different as regards the months of maximum and minimum values, to areas in similar latitudes in South Africa and in Australia.[1]

In reviewing the swing of the rainfall through the year it is well

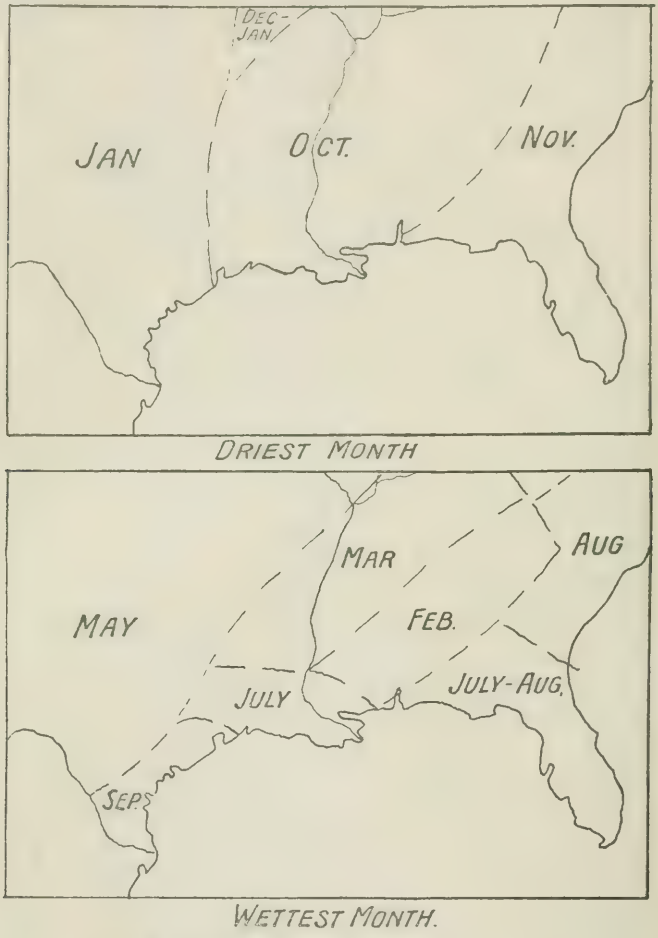


FIG. 3.—Wet and dry seasons in the Cotton Belt.

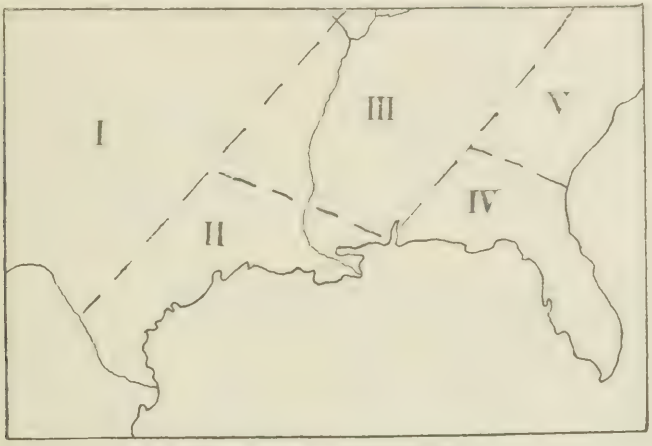
to commence with the period about the autumnal equinox. In September the rainfall is approximately normal in intensity (P. C. 100), except in the areas which project farthest southwards. In October the intensity decreases everywhere. From November to January the area where the intensity is above the normal is relatively small and moves gradually

[1] Vol. xxx. pp. 366 and 528.

eastward ; on each side of this area the rainfall is less intense and reaches a minimum near the coast, south-east, in November and in the north-west in January. From February to April the intensity increases slightly everywhere, yet it nowhere exceeds 167.

Summarising this period, the cold period between the equinoxes, it may be noted that the intensity of the rainfall is, in general, low : so that, during the period when killing frosts are possible, the precipitation tends to be at a minimum.

In May different conditions appear. In the north-west, nearest to the heart of the North American continent, the intensity of the rainfall is high and the pluviometric gradient is continuously downwards towards the south-east. The conditions of May are repeated in June, except that a high intensity appears in Florida and along the coast. Conse-



RAINFALL REGIONS.

FIG. 4.

quently, as the insolation attains its maximum, the rainfall becomes heavy, although the maximum rainfall tends to be a month later on the coast than it is in the continental area. In July these summer conditions persist with a slight loss in intensity in the north-west and a slight gain in the south-east. In August the south-east is rainier than the north-west, and the June conditions are reversed.

Summarising the warm period, it is found that the rainfall in the central area tends to be slightly above the normal, that heavy rains are the rule in the other regions, and that these rains begin later and persist later on the coast than in the north-west. As a general rule, in the area of the cotton belt, increased insolation means more rain.

In contrast with similar latitudes in North Africa, the rains occur at a different period : in Africa the rain tends to fall when the sun is relatively low in the sky ; in the cotton belt the intensity of the rainfall tends to vary directly with the increasing altitude of the sun.

The wettest and driest months are indicated in Fig. 3, where it is

shown that there are three areas of dryness and five areas of relatively intense rainfall; and since the southward extensions of the United States are relatively small in area, it may be suggested that they deserve comparatively little attention in regard to the conclusions which are now to be drawn. Fig. 4 indicates the five rainfall regions of the cotton belt which are derived from Fig. 3. The monthly variations in the intensity of the rainfall for these five regions on the average are shown in Fig. 5, where the graphs begin in September and show the cold period on the left and the warm period on the right.

None of these graphs is quite simple, so that the rainfall does not vary in thorough sympathy with the insolation. Region I., the continental area to the west, has a rainfall sequence most closely related

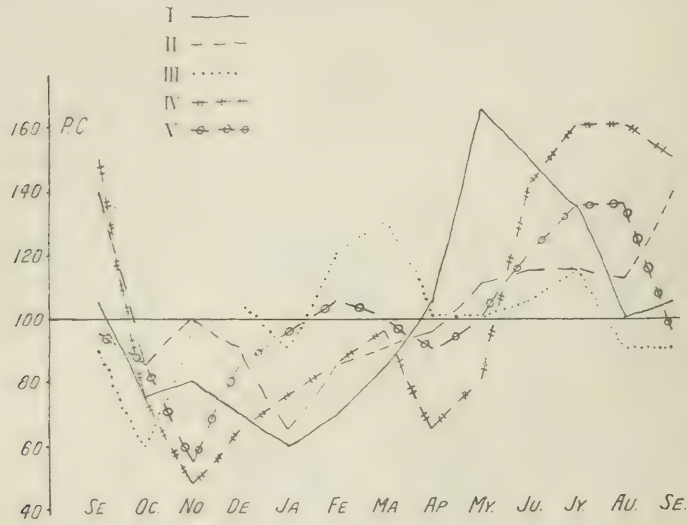


Fig. 5.—Changes in Rainfall throughout the year.

to the variation in the altitude of the sun. Region IV., the oceanic area to the east, has a similar sequence to that of Region I., except that it shows evidence of the slackening effect due to the presence of large masses of water in the neighbourhood. Region V. is similar to Region IV., so that in a general way these two regions may be regarded as a belt of summer rainfall masked by oceanic influences. Region II. is a special region where the rainfall resembles that of Region I. during the cold period and that of Regions IV. and V. during the warm period. Region III. is quite different from the other regions; the greatest variations occur about the equinoxes, and the rainfall during the remainder of the year is approximately normal. Region I. forms a part of a belt of continental summer rainfall and Region III. forms part of a belt of variable rains at all seasons, due to the interaction of continental influences, *i.e.* insolation, and oceanic influences. The oceanic influences almost entirely mask the

effects of insolation, so that the region is intermediate between the other two belts.

There are numerous other small fluctuations indicated by the graphs in Fig. 5, and examination shows that these are usually connected with fluctuations in abnormal temperature, as shown by the map of isanomalous temperatures.[1] Whenever the rainfall intensity drops unexpectedly, as in some cases in November, the area of low intensity is an area of abnormally low temperatures; conversely, the steep rise in May and June is connected with an excessive increase of temperature in those areas in comparison with the rest of the district.

Consequently, the rainfall of the cotton belt shows extensive variations. The total annual fall varies from 31 inches in the west to 54 in the south-east. There are three belts which differ in the sequence of their rainfall, and in these belts there are fluctuations of considerable magnitude.

It appears certain that the variations in rainfall conditions are intimately related to variations in actual air temperatures, so that an average low temperature means, as a rule, a small amount of precipitation. Broadly speaking, the intensity of the rainfall is due to normal temperatures governed by the insolation, to abnormal local changes in temperature, and to the slackening effect due to the oceanic influences from the east and south.

2. The Work of the Cotton Planter.

The agricultural year in the cotton belt is displayed in Table I. in the appendix.

Cotton is planted just after the spring equinox, when the danger from killing frosts has almost passed; it grows during the whole of the warm period, until the autumnal equinox, which occurs about one-third of the way through the plucking season, and the latter lasts throughout September, October and November. Consequently, the growing period for the plant coincides with the period of heaviest rainfall, and the crop is harvested during the months when the rainfall is declining to its minimum.

In Table II. the net effect of this arrangement of the planter's operations is indicated in relation to the crop rainfall. Although the total annual precipitation over the cotton belt varies from 30 to 50 inches, the amount of rain which usually falls during the growing period only varies from 17 to 23 inches and is, on the average, about 20 inches. The planter, by varying the dates of sowing and harvesting, tends to arrange his work so as to secure the same precipitation during the growing period wherever his plantations may be.

The relative importance of the area, as regards cotton in comparison with other crops, and also as regards the cotton grown elsewhere in the United States, is indicated in Table III. The States which have been enumerated are, here, called the cotton belt, since they produce practically the whole of the cotton crop of the United States.

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[1] Vol. xxx., July 1914.

In reference to the total area of each State, South Carolina, Georgia, Alabama and Mississippi had the greatest crops, and the rainfall in these states during the growing period is 19 or 20 inches. The greatest average yield per acre occurs in the two Carolinas and Mississippi, where the crop rainfall is average in amount. From a comparison of columns (e), (c) and (d) (Table III. Cotton), it appears that the best cotton-growing states are Georgia and Alabama, where the crop rainfall approximates closely to the average.

It may be concluded, therefore, that the best conditions for growing cotton occur about latitude 32° N. in an area where the total annual rainfall is about 50 inches per annum, where the temperature is normal and therefore almost entirely a function of the latitude, and where the crop rainfall depends upon the rising temperature and upon the slackening effect of oceanic influences, so that an average rainfall of 20 inches can readily be obtained during the five or six months required for the growth of the cotton plant.

3. Other Agricultural Work.

In reference to the other crops specified in the tables, the cotton belt produces, roughly, one-third of the maize, a quarter of the tobacco, one-ninth of the wheat and one-twelfth of the oats of the United States. The cultivation of maize is general, that of tobacco is limited to the north-eastern district, and wheat and oats are produced in the cooler areas. In comparison with the north-eastern United States,[1] *i.e.* the area north of the cotton belt and east of St. Louis, the cotton belt produces more maize, but less wheat, oats and tobacco.

The agricultural year in the cotton belt occupies eleven months, only the final third of December and first two-thirds of January being free from operations in the field; thus the cotton belt is in striking contrast with the north-eastern United States, where the agricultural year is limited to the period from mid-March to mid-October. The total annual precipitation in the north-eastern United States is less than in the cotton belt, east of the Mississippi, yet the total rainfall of the growing periods of certain crops remains constant for winter wheat, winter rye and tobacco.

Average crop rainfall in inches.

	Winter wheat.	Winter rye.	Tobacco.
NE. United States . .	32	30 (a)	14 (b)
The cotton belt . .	30 (c)	30 (c)	14

(a) except Mass. (b) the large growers. (c) except Texas.

In the case of oats the rainfall during the growing period in the north is 14 inches, in the cotton belt this quantity is exceeded except in Texas and by a small amount in Oklahoma. The net result is that the cultivation of oats in the cotton belt tends to decline (Table III.), and

[1] Vol. xxx. p. 593.

this decline is most marked in the cases where the cultivation is relatively unimportant; oats do not form, therefore, a crop of prime importance in the cotton belt.

The cases of maize is of special interest. In the north-east United States the crop rainfall is but 16 inches, whereas it is 26 inches in the cotton belt, the growing periods being respectively four and six months in length. Sowing begins much earlier in the cotton belt. Each of these two areas tends to be uniform within itself, so that the governing factor appears to be the probability of frost in the north east United States. The difference in crop rainfall, and in the length of the growing period, may be associated with a striking difference in the yield per acre, which is relatively small within the cotton belt.

4. Conclusion.

In general it may be concluded that the planter or farmer in the cotton belt reacts, to an environment of greatly diverse conditions, in regard to rainfall in such a way as to bring his agricultural year into line with an average standard, and in many cases this average standard is the same as that which obtains in the North-eastern United States. Where he can fall into line most successfully he tends to obtain the best results.

This investigation reveals how closely his success is bound up with "the march of the sun in the sky," his temperatures and his rainfall are both largely conditioned by solar influences, and where these influences are subject to modification or interference he adjusts his labours so as to conform to an average standard. It is not suggested that this reaction is necessarily, consciously aimed at a conformity to type, nor that each planter or farmer deliberately sets out to obtain so specific a result, for the method of investigation herein adopted does not lend itself to an inquiry pertaining to the individual. On the contrary, it is suggested that the results herein discussed are norms which represent the average experience, which it is the business of geographical science to discover. The practice of the planter will, in general and on the average, form the surest guide to the conditions of success which can operate over a large area in connection with an industry of the scope which is presented by the production of about two-thirds of the world's cotton.

Since cotton is at the same time the most general and the most important crop in the south-eastern portion of the United States, it is natural that the human reaction to environment should be more uniform and more successful in the case of cotton than in the case of oats.

In a wide survey of this nature local variations of time or space, of soil or climate, are necessarily ignored, but the broad uniformities which have been shown to exist are the main facts which concern the geographical investigator.

TABLE I.—THE AGRICULTURAL YEAR.

	Beginning of Sowing.	Beginning of Reaping.	End of Reaping.		Beginning of Sowing.	Beginning of Reaping.	End of Reaping.
Wheat, winter,	*A*	*a*	**a**	Oats, fall,	*F*	*f*	**f**
Wheat, spring,	*B*	*b*	**b**	Oats, spring,	*G*	*g*	**g**
Rye, winter,	*C*	*c*	**c**	Maize,	*H*	*h*	**h**
Barley, fall,	*D*	*d*	**d**	Tobacco,	*I*	*i*	**i**
Barley, spring,	*E*	*e*	**e**	Cotton,	*J*	*j*	**j**

This table is based upon the results of an inquiry into dates of farm operations published in the Year-book of the Department of Agriculture, U.S.A., 1910, pp. 489-493.

	Jan.	February.			March.			April.			May.			June.			July.			August.			September.			October.			November.			December.		
	21-31	1-10	11-20	21-28	1-10	11-20	21-31	1-10	11-20	21-30	1-10	11-20	21-31	1-10	11-20	21-30	1-10	11-20	21-31	1-10	11-20	21-31	1-10	11-20	21-30	1-10	11-20	21-31	1-10	11-20	21-30	1-10	11-20	21-31
N. Carolina, .	.	.	.	*G*	.	.	*H*	.	*J**	*I*	.	.	.	*f*	*acg*	**af**	**cg**	.	.	*i*	.	.	*C j* **i**	.	*F h*	.	*A* *	.	.	.	**h**	**j**	.	.
S. Carolina, .	*B*	.	.	.	.	*H*	.	*IJ*	*	.	.	.	*cf*	*b*	*a* **c**	**abf**	.	*i*	.	.	**i**	*j*	.	*h*	*C*	*F*	*A*	*	.	.	.	**j**	**h**	.
Georgia, . .	.	*G*	.	.	.	*H*	.	*J*	*	.	.	.	*cf*	*a*	*g* **c**	**af**	**g**	.	.	.	.	*j*	.	*C h*	.	*F*	*A* *	.	.	.	**h**	**j**	.	.
Florida, . .	.	.	.	*H*	.	*J*	*I*	.	*	.	*f*	.	.	**f**	*i*	.	.	.	.	**i**	*j*	*h*	.	.	.	.	*F* **h**	.	*	.	**j**	.	.	.
Louisiana, . .	.	.	.	*H*	.	.	*J**	.	.	.	.	.	*f*	.	**f**	.	.	.	.	.	.	*j*	*h*	.	.	.	*F*	.	**h** *	.	.	.	**j**	.
Tennessee, . .	.	.	.	*G*	.	.	*H*	.	*	*J*	*I*	.	.	*a*	.	*g* **a**	.	**g**	.	.	*i*	.	*j*	.	*A h* **i**	*	.	.	.	.	**j**	**h**	.	.
Mississippi, .	.	*G*	.	.	.	*H*	*	*J*	.	.	.	.	.	*fg*	**f**	**g**	.	.	.	.	.	*j*	.	.	*h*	*F*	.	*	.	**h**	.	**j**	.	.
Alabama, . .	*G*	.	.	.	.	*H*	.	*J*	*	.	.	.	*f*	*ag*	**f**	**ag**	.	.	.	.	.	*j*	.	*h*	.	*A F*	*	.	.	.	.	**hj**	.	.
Oklahoma, . .	.	*G*	*E*	.	.	*H*	.	*J*	.	*	.	.	.	*c*	*acg*	.	**aceg**	.	.	.	.	.	*G*	*A hj*	.	*	.	.	.	**h**	.	**j**
Arkansas, . .	.	*G*	.	.	*H*	.	.	*J*	*	.	*I*	.	.	*a*	*g*	**a**	**g**	.	.	.	*i*	.	*j*	.	*A h* **i**	.	.	*	**h**	.	.	**j**	.	.
Texas, . . .	*BG*	.	*H*	.	.	*J*	.	.	.	*	.	.	*afd*	*c*	*b* **f**	**ac**	*g* **b**	**d**	**g**	.	.	*j*	*h*	*C*	*A D*	*F*	*	.	.	**h**	.	**j**	.	.

* Periods of First and Last Killing Frosts, on the Average.

TABLE II.—THE TOTAL PRECIPITATION DURING THE GROWING PERIOD OF CERTAIN CROPS.

State.	Winter Crops.				Spring Crops.									
	Wheat.		Rye.		Wheat.		Oats.		Maize.		Tobacco.		Cotton.	
	(*a*)	(*b*)	(*a*)	(*b*)	(*a*)	(*b*)	(*a*)	(*b*)	(*a*)	(*b*)	(*a*)	(*b*)	(*a*)	(*b*)
N. Carolina,	8	30	9⅕	36	...	...	3⅖	15	6	28	3⅕	15	4⅖	20
S. Carolina,	8⅕	30	8	27	4⅕	20	...	...	6	26	3⅕	15	4⅖	19
Georgia,	7⅖	30	8⅕	33	...	...	4⅕	18	6	28	...	..	4⅖	21
Florida,	...	...	...	...	...	...	...	...	6	28	2⅖	11	5	23
Louisiana,	...	...	...	...	...	...	...	...	6⅕	27	...	...	5	22
Tennessee,	8⅓	32	...	...	...	...	4	22	6	24	3⅕	13	4⅕	17
Mississippi,	...	...	...	...	...	...	4	19	6⅕	29	...	...	4⅖	20
Alabama,	8	32	...	...	...	...	4⅕	20	6	26	..	...	4⅖	19
Oklahoma,	9	24	9	23	...	...	4	16	5⅖	22	...	...	5	19
Arkansas,	8⅕	32	...	...	...	...	4	19	6⅕	29	3	14	4⅖	19
Texas,	8	18	8⅖	20	4⅖	11	5⅕	14	6⅕	18	...	...	5	17

(*a*) = No. of months of growing period ; (*b*) total precipitation, during the period, in inches.

TABLE III.—RELATIVE AGRICULTURAL PRODUCE.

	Maize.				Wheat.				Oats.				Tobacco.			Cotton.			
	(*a*)	(*b*)	(*c*)	(*d*)	(*a*)	(*b*)	(*c*)	(*d*)	(*a*)	(*b*)	(*c*)	(*d*)	(*a*)	(*f*)	(*e*)	(*c*)	(*g*)	(*c*)	(*d*)
N. Carolina,	910	17	28	30	108	10	13	14	63	17	5	13	95	5	175	3	208	44	52
S. Carolina,	870	16	21	23	89	10	9	6	121	21	6	9	13	7	24	8	215	78	95
Georgia,	890	14	40	41	44	10	5	13	74	18	10	17	..	...	..	7	188	150	140
Florida,	120	12	6	6	...	...	...	...	73	16	1	1	2	7	2	2	112	8	6
Louisiania,	630	22	22	18	...	...	...	...	10	20	1	1	...	...	...	4	162	30	51
Tennessee,	1910	24	33	34	204	11	19	28	77	21	6	13	44	7	69	2	189	23	31
Mississippi,	880	18	28	28	...	...	..	...	37	18	5	6	...	...	...	7	206	100	119
Alabama,	860	15	31	32	19	11	3	2	71	18	8	11	...	...	...	7	188	110	123
Oklahoma,	1700	19	51	6	212	13	32	23	171	27	18	...	...	...	...	3	163	68	22
Arkansas,	910	21	25	29	31	12	4	6	67	24	5	12	...	...	..	4	188	69	74
Texas,	630	20	77	55	34	12	25	30	78	28	20	27	...	....	...	3	116	315	284
Total,	...	...	362	302	...	...	110	122	...	...	85	110			270			995	997

(*a*) Crop in bushels per square mile of total area of State.
(*b*) Yield in bushels per acre.
(*c*) Fraction of U.S.A. area devoted to the crop in 1910 (per mille).
(*d*) „ „ „ „ 1900 „
(*e*) Crop in tons per square mile of total area of State.
(*f*) Yield in cwt. per acre.
(*g*) Yield in lbs. per acre.

SOME CONSIDERATIONS IN ECONOMIC GEOGRAPHY IN CONNECTION WITH THE WAR.[1]

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In this lecture I intend to confine myself for the most part to considerations connected with the trade of Germany and the United Kingdom. It is, indeed, only a few of the most important effects of the war on the trade of those countries, both generally and in their mutual relations, that can be considered in the course of an ordinary lecture.

I. German Trade in 1913.

Imports.	mil. £	%	mil. tons (metric).	Exports.	mil. £	%	mil. tons (metric).
1. Grain,	60·8	11·4	8·3	1. Iron and steel implements,	67·0	13·3	6·5
2. Raw cotton,	20·4	5·5	0·5	2. Machinery,	33·9	6·7	0·6
3. Raw hides and skins,	22·6	4·2	0·2	3. Coal and coke,	32·3	6·4	41·0
4. Oil seeds and spirits,	22·6	4·2	1·3	4. Grain,	19·8	3·9	2·5
5. Raw wool,	18·4	3·5	0 2	5. Cottons, Dyed, printed, etc.,	19·5	3·9	0·1
6. Copper,	17·6	3·3	0·2		6·3	1·3	...
7. Coffee,	12·5	2·3	0·2	6. Electro-technical products,	14·5	2·9	0·1
8. Pine wood,	12·4	2·3	4 9	7. Chemicals,	14·5	2·9	...
9. Iron ore,	11·6	2·2	14·0	Coal-tar dyes,	8·2	1·6	...
10. Animals,	9·9	1·9		8. Sugar,	13·2	2·6	1·1
12. Coal,	9·7	1·8	10·5	9. Woollens,	12·0	2·4	...
14. Yarn, cotton, and wool,	8·3	1·6	...	11. Leather,	10·1	2·0	...
15. Nitrate of soda,	8·5	1·6	0·8	15. Silks and half silks,	6·2	1·2	...
Tin,	3·0	0·6	...	18. Hides, skins, raw,	5·2	1·0	...
Tin-plate,	0·6	0·1	...				
Total,	535	100	...	Total,	504	100	...

In this and other tables designed merely to indicate roughly the order of importance the mark is converted at 1s., not at the more precise equivalent of 11·8d., now adopted by the Board of Trade.

Table I. exhibits the leading items in addition to some other items of special interest in the trade of Germany, according to the preliminary returns for 1913. From this you will see that the trade of Germany has, on the whole, a great similarity to our own, showing a marked predominance among the imports of food stuffs and raw materials, and among the exports of manufactured goods,

[1] A Lecture delivered to the Royal Scottish Geographical Society on the 16th of December 1914.

together with coal and coke, although on this side one must note also a considerable export of grain as well as of sugar, which, although it involves manufacturing processes, is nevertheless also a product of German agriculture. This correspondence between the trade of the two countries, it may be mentioned, is of comparatively recent development. In the early years of the German Empire by far the most important item in the exports of the Empire was grain, and the exports of iron and steel manufactures, machinery, coal and coke, chemicals, and of most of the other manufactures that you will see in this list, were insignificant. This change is often set down as one of the results of the formation of the Empire, but I have already, in another lecture delivered to this Society, indicated, at least to some extent, my reasons for believing that the rapid growth of German manufactures and commerce after the proclamation of the Empire was mainly a coincidence, and was in fact only in small part promoted by the circumstances that gave rise to the Empire. The fact is that for reasons which it would be out of place to enter into here, the development of the resources of Germany by modern methods happened to be very backward in the early seventies of the last century, and it was only about that time that those methods came to be applied to bring about that development. Already, it must be remembered, Germany was provided with an able and highly educated population, and in these circumstances it was certainly not to be wondered at that the development should have then proceeded with great rapidity. As in our own country, the first two imports are now grain and raw cotton, in that order, and it is somewhat striking that grain bears very nearly the same proportion to the total imports as it does in the commerce of the United Kingdom; but in making this comparison you must note that the proportion of the external trade of Germany to the internal is far from so great as with us, so that the 11·4 per cent. that you see in the table for the grain import has not the same significance as a corresponding percentage in the trade of our own country. Among the grains imported into Germany the most important are barley and wheat. The import of rye, which is the principal bread plant in Germany, is insignificant, and since 1908 has been more than balanced by the export under the same head. The wheat import is in Germany equal to only one-third of the total consumption,[1] instead of about four-fifths as with us; the import of barley, on the other hand, is nearly a half of the total requirement.[2] In both cases the import is accordingly large and raises the question as to whether Germany is likely to be seriously embarrassed by a prolonged war through any deficiency arising in her food supply. Officially it was estimated by the Germans that they had

[1] Average of the seven years 1907-1913 following the imposition of the enhanced import duties which began to be levied on March 1, 1906 (German seed grain excluded).

[2] For the same period 48 per cent. It should be added that the proportions of import to consumption given in the text are based on the assumption that the German official estimates of the yield of bread-grains are approximately accurate, whereas Dr. Ballod gives in the article cited below in the text (pp. 132-4) reasons for believing that they are much exaggerated, in some cases by more than one-fifth. These reasons, however, are called in question by Count Von Moltke in an article in the August number of the *Preussische Jahrbücher*, pp. 297-8.

at the beginning of the war enough rye to meet a year's consumption, and enough wheat to meet a consumption of eleven months; and it was considered unlikely that Germany would be wholly cut off from fresh supplies when the war broke out. Still it is worth while to look to Germany's sources of supply, and we find that more than half of Germany's import of wheat comes from Russia, which also furnishes Germany with nearly seven-eighths of her imported barley. That source of supply is in both cases cut off by the war, and although no doubt both wheat and barley may be got elsewhere we shall afterwards consider what Germany's difficulties in replacing the Russian contributions are likely to be. But, as was pointed out by a German economist, Dr. Carl Ballod, Professor of Political Science in the University of Berlin, and a member of the Royal Prussian Land Office, in an article that appeared in the *Preussische Jahrbücher* for last July, shortly before the outbreak of the war, the question of food supply is not a simple one. It may be true that if all the wheat and rye actually existing in Germany at that time, or likely to exist at the end of the harvest, were available for human consumption, then the anticipation as to the period for which rye and wheat would respectively hold out might be fulfilled, but Dr. Ballod points out, as some of you may remember to have seen stated in the *Scotsman*, that Germany needs to import 60 per cent. of the food required for cattle and stock in general, these supplies coming in the form of coarser grains, as well as fodder of other kinds. And he adds that if the Germans were reduced to their own resources for the feeding of those animals the milch cows would thereby be diminished to one-third of their value, at least as milk producers. Further, two-thirds of the pigs, which form a very much more important element in the live stock in Germany than in that of the United Kingdom, could not be fattened and would be killed and put out of account as rapidly as possible.[1] The general result would be that the available quantity of butcher meat would, sooner or later, come to be diminished, and therefore the consumption of bread would be augmented in the same proportion, so that the stock of bread plants would need to be largely increased in order to meet this increased demand. That Germany was already beginning to feel the need for economising her resources about the end of October is apparent from the fact that an official order was then issued regulating the prices and to some extent the use of bread-grains. The usual imports of fodder barley from Russia being stopped, the more valuable German barley began to rise in price, and rye was substituted as a fodder crop. A Government decree accordingly declared that the maximum price for barley should be less than that for rye, and that all bakers should make bread of mixed flour; that wheaten bread should contain at least 10 per cent. of rye flour, and rye bread at least 5 per cent. of potatoes, as much as 20 per cent. being permitted. Maximum prices were fixed for different parts of the Empire,

[1] Count von Moltke in the article cited in note 2 on p. 83, argues (pp. 298-9) that it is unnecessary to maintain the numbers of the live stock in war-time, but it is difficult to see how in that case he can evade Dr. Ballod's conclusions as to the result of such reduction in numbers.

so as to allow for the cost of carriage from the source of supply. The maximum for rye was to be equal to £11 per ton at Berlin, £10, 9s. at Königsberg, £11, 17s. at Munich, Aachen, and Strassburg. These prices were to hold good from November 4 to December 31, 1914, after which there was to be a rise of 1s. 6d. per ton every fortnight. These measures, it is true, need not be taken as showing any actual need at present, but are put forward simply as a means to ensure foresight on the part of the people, and to prevent them from encroaching too rapidly upon their resources. But the difficulty of adequately feeding their live stock has been generally foreseen in Germany. It would appear to be indicated by the low meat prices there early in the war, these being attributed to the fact that large numbers of live stock were killed off owing to the increasing price of food stuffs, and if that is so, that period of abundance and low prices is likely to prove a forerunner of scarcity and excessively high prices in future.

Then, further, if the war should be prolonged beyond a year and Germany should come to depend upon her own resources, or almost entirely upon her own resources, for a second year's supply of food, there is one feature in German agriculture which seems to me of great significance, viz., that already quite an exceptional proportion of the agricultural labour of Germany is performed by women. The three occupation censuses that have taken place in Germany, in 1882, 1895, and 1907 respectively, have shown a rapid increase in this proportion, and although part of this increase is undoubtedly due to the fact that agricultural employees belonging to the families of the farmers had not at one time been registered as employees, but took care to have themselves so registered after the passing of the insurance legislation of Germany, so that they might take advantage of that legislation, still the growth is to some extent real, and at any rate the proportion as compared with our own country is very large, at the census of 1907 being equal to 47 per cent. of the total number of agricultural employees. Now the male agricultural population must certainly be drawn upon to a considerable extent to fill the armies in the field. If it is true that the proportion of agricultural employees withdrawn for military service is not so high as in other industries owing to their higher average age, still Dr. Ballod estimates[1] that in round numbers 1,000,000 agricultural labourers must be drafted to the colours, say one in five. In similar circumstances in other agricultural countries the labour thus lost is often to a large extent made good by the employment of female labour, but in Germany it is difficult to suppose that there is a large reserve of female labour to draw upon. These considerations make it extremely doubtful whether there could be next year anything like as large a production of food stuffs in Germany as in the year which has furnished the supplies now being used. It would indeed be, as always, hazardous to prophesy, but it seems likely that if we are able to retain the command of the sea, Germany, even if we consider merely the food supply, will be less able to hold out than we are.

[1] *Ubi supra*, p. 112.

Now for some of the other imports. Next to our own country Germany is the largest consumer, outside the United States, of raw cotton. The bulk of that comes indeed from the United States but about a quarter comes from British India and Egypt, a supply that is likely to be totally cut off. Of the whole supply about 40 per cent. comes from British India and Egypt. More than 50 per cent. of all the wool imported into Germany comes from British possessions. Among animals, the horses come in considerable numbers, and pigs and geese almost entirely from Russia. Russia is also the source of more than two-fifths of the wood supply of Germany, and of the coal which Germany imports five-sixths comes from the United Kingdom. It will thus be seen that, if we look merely at the ordinary countries of origin, without considering the difficulties of trade generally that Germany has to encounter, a large proportion of their supplies of raw materials is likely to be cut off. If that is so there will be an increasing difficulty in keeping the population not in arms employed. The ordinary mechanism of commerce and trade will be to a large extent destroyed, and in that way the ordinary means of distribution of income will be put out of working. Even, therefore, if food still continued to be available for the population, an increasing proportion of the inhabitants would become unable to procure their food in the ordinary way, and would be thrown for support upon state organisations.[1] The export market will also be similarly interfered with to a large extent. The United Kingdom is the principal market for about three-fourths of the sugar exported by Germany. For the iron and steel manufactures of Germany the principal markets are Great Britain and Russia; of the machinery which Germany exports, Russia, France, Belgium and Great Britain take in all above one-third. For the electro-technical and chemical products exported by Germany, Great Britain is the largest market, and Russia and France together take an amount exceeding that of Great Britain.

Now look at the third column in Table I. Notice the articles which bulk largely among the imports and exports in respect of quantity. You will see on the import side these are iron ore, coal, grain and wood, followed at a considerable distance by nitrate of soda. Now these are all mainly—nitrate of soda wholly—imported by sea. Among exports the iron and steel manufactures, and the grain, are also to be noted among the bulky products exported mainly by water. On the other hand, the coal and coke now so largely exported principally goes by land or inland waterways, about one-third of it finding its way into Austria-Hungary, the countries next in order of importance as receiving German coal being the others immediately adjoining. Still an increasing proportion of this article also is now exported by sea. I draw special attention to this, because trade in bulky articles is unquestionably one of the important causes promoting the growth of shipping, and hence it is not surprising to see with what rapidity the German mercantile marine has grown within recent years, as shown in Table II.

[1] Towards the end of January 1915, it was officially announced that on February 1 all the corn and flour in Germany would be seized by the Government with a view to the distribution of these commodities by the State in proportion to population.

And here we have to consider another effect of the war, very serious for Germany. During the whole war we have been learning from time to time, with great regret, the loss which the German fleet has been able to inflict upon British shipping. But after all that is no more than what was foreseen and provided for; it would appear, from the profitable nature of the business which the Government is said to be carrying on in marine insurance, amply provided for.[1] The loss that this country has thereby incurred is small compared with that which is suffered by the German mercantile marine through its being absolutely unable to venture to sea, except on the home waters. It is reported that one large German shipping company, said to be the greatest cargo steam shipping company in the world, has had to resort to the method of chartering ships flying the flags of Norway, Holland, America, and even of Great Britain, in order merely to preserve its organisation, its own shipping having been either seized or laid up in neutral ports. It was probably the same German company which lamented that, in consequence of their seventy ships being laid up, they found five thousand men on

II. Steam Tonnage—United Kingdom and Germany.

Thousands of Tons (000 omitted).

Years.	United Kingdom.	Germany.	German percentage of aggregate.
1872	1,538	130	7·8
1882	3,335	311	8·5 ,,
1892	5,564	786	12·4 ,,
1902	8,104	1622	16·7 ,,
1912	10,992	2655	19·5 ,,

their hands for maintenance, these including many Lascars, accordingly British subjects, engaged for a period of years, after which they have to be returned under contract to India. Table III. shows how enormously Germany has suffered under this head as compared with the United Kingdom.

At Table IV., showing the proportion of German trade for 1912 with different countries (under this head I know of no later figures already available), I will ask you to look more briefly. But by way of supplement I may add that if we consider the trade carried on with enemy countries as wholly lost, and take the year 1912 as a standard of reference, then we find on the import side that Germany would lose in a year about £236,000,000 of trade, or more than 44 per cent. of the total; on the export side, £181,000,000, or upwards of 40 per cent. of the total; whereas the corresponding loss to the United Kingdom would be about £84,000,000, or a little more than 11 per cent. on

[1] This is pretty clearly indicated by the rapid reduction in the insurance premium. The Government rate for cargoes was fixed at five guineas on August 5, 1914, and was reduced to four guineas on August 8, to three guineas on August 18, to two guineas on August 31, and to one guinea at the end of the year.

the import side, and £66,000,000, or under 11 per cent. on the export side.

But the matter is not so simple. It may be taken as absolutely certain that the loss of trade to both countries will be at a higher rate than that indicated. In the first four months of the war the loss in imports to the United Kingdom has been nearly £63,000,000, in exports nearly £84,000,000, in all above £146,000,000 as compared with the corresponding period of last year.[1] Germany's loss must be increased in a still greater ratio. For let us consider the trade of Germany with neutral countries. First we have to note that owing to the British blockade the most important German seaports, Hamburg and Bremen, as well as Emden, are hardly available. On the Baltic, it is true,

III. Navy's Effective Work.

(Board of Trade, 26th November 1914.)

	United Kingdom.				Germany.			
	No.	%	Tonnage. 000 omitted.		No.		Tonnage. 000 omitted.	%
Total of ships over 100 tons gross, .	10,123	100	20,524	100	2090	100	5,132	100
Unavailable, .	195	1·9	586	2·9	1221	58·4	4,585	89·3
Captured, .	49	...	...	...	80	...	...	...
Detained in enemy ports,	75	...	...	...	166	...	...	...
Held up in neutral ports, etc.	71	...	...	...	646	(neutral ports)		
					329	(German ports)		
Still plying, .	9928	98·1	20,122	97·1	869	41·9	55	10·7
Known to be at sea, . .	...	...	...	...	10	...	...	...
Ships over 500 tons not accounted for, .	...	...	...	...	125	...	...	...
Steam trawlers,	...	..	...	...	353	...	...	...
Small coasters,	...	...	...	...	381	...	...	...

Germany still has command of the sea, and can make use, therefore, of the ports of Stettin, Königsberg, Danzig, Lübeck, and others, but for her oceanic trade she is thrown back upon the Austrian port of Trieste, and neutral ports such as Rotterdam, Copenhagen, and Genoa, as well as Scandinavian ports by means of which her own Baltic ports can be reached. Of all these the most important of course to Germany is Rotterdam, how much the most important we shall understand better from the light which we shall get from a subsequent table. The routes by Scandinavia and Italy are not only devious, but must be made even more expensive by the heavy gradients that have to be overcome when they are followed. That from Genoa to the Rhine valley involves

[1] Down to the end of the year, first five months of war, the corresponding loss was £67,000,000 in imports, £105,000,000 in exports—together £172,000,000.

the climbing of three mountain ranges and the use of three mountain tunnels—through the Apennines, immediately behind Genoa, through the Alps by St. Gothard, and through the Jura by the Hauenstein, where the gradient adds so much to the cost of working the railway that a new tunnel is now being made at base level.

Then one has to bear in mind that neither British nor German shipping will be available for carrying on the trade between Germany and the neutral countries for the reasons already seen. That a serious difficulty is created by the fact that British shipping will not be available for the purpose will be understood when one bears in mind that even when the German shipping held the seas, British shipping made up considerably more than 40 per cent. of the total shipping of the world and obviously, therefore, it makes up a much larger proportion of that which is now employed. And, further, the trade that is carried on by means of neutral shipping is subject to being interfered with in respect

IV. German Trade, 1912.

Imports.			Exports.		
	mil. £	%		mil. £	%
1. United States, . .	79·3	14·8	1. United Kingdom, .	58·1	13·0
2. Russia, . . .	76·4	14·3	2. Austria-Hungary, .	51·8	11·6
3. United Kingdom, .	42·1	7·9	3. United States, . .	34·9	7·8
4. Austria-Hungary, .	41·5	7·8	4. France, . . .	34·5	7·7
5. France, . . .	27·6	5·2	5. Russia, . . .	34·0	7·6
6. British India, . .	26·7	5·0	6. Netherlands, . .	30·4	6·8
7. Argentina, . .	22·2	4·2	7. Switzerland, . .	26·0	5·8
8. Belgium, . . .	19·3	3·6	8. Belgium, . . .	24·7	5·5
9. Netherlands, . .	17·3	3·2	9. Italy, . . .	20·1	4·5
10. Brazil, . . .	15·7	2·9	10 Denmark, . .	12·7	2·8
11. Italy, . . .	15·2	2·9	11. Argentina, . .	12·0	2·7
12. Australia, . .	13·8	2·6	12. Sweden, . . .	9·9	2·2
Total, .	535	100	Total, .	448	100

of contraband articles, among which, in accordance with an order in Council promulgated on the 29th of October, are included, among other things, all food stuffs as conditional contraband, and motor spirit, and oils capable of being used for the same purpose, beside nickel ore, nickel, ferro-chrome, chrome ore, copper, aluminium, and ferro-silica, all these being minerals badly needed by Germany for the manufacture of the implements of war, as absolute contraband. By a previous order in Council issued two days before, the convention known as the Declaration of London, a convention that had never been formally ratified, but which in the beginning of the war the Government had intimated its intention of adhering to so far as practicable, had been abandoned to such an extent as to allow of the capture of contraband articles in neutral vessels when such articles were clearly intended for enemy countries, and to render a neutral vessel liable to capture and condemnation in the event of her going to an enemy port, notwithstanding a

different destination shown in her papers, if she should be captured before the end of her next voyage. In addition to that the British Government has prohibited the export of a large number of articles, including saltpetre, nitrate of sodium, soft paraffin, confectionery, tea, wool and woollen manufactures, leather, pig-skins, hides, hemp, cordage and twine, and a number of other articles which should be of special importance to Germany in the present circumstances. In some cases these regulations have been modified, but only under conditions that would seem to preclude all possibility of the exported goods reaching an enemy country.

Let us look now at Table V. showing the leading exports from the United Kingdom to Germany. I must deal with it very briefly,

V. United Kingdom Exports to Germany.

United Kingdom Produce, 1913.	mil. £	%	Foreign and Colonial, 1913.	mil. £	%
1. Coal, coke, and fuel,	5·35	13·1	1. Wool, sheep, and lamb,	4·10	20·7
2. Cotton yarn,	5·14	12·6	2. Rubber,	3·34	16·9
3. Yarn, woollen, mohair, etc.,	4·80	11·8	3. Undressed skins and furs,	2·86	14·4
4. Herring,	2·82	6·9	4. Lard,	·74	3·7
5. Cottons,	2·43	6·0	5. Leather,	·74	3·7
6. Woollens,	2·09	5·1	6. Coffee,	·72	3·7
7. Machinery,	1·89	4·6	7. Jute,	·71	3·6
8. Cotton piece goods,	1·80	4·4	8. Tallow,	·29	1·5
9. Iron and steel manufactures,	1·68	4·1	9. Ornamental feathers,	·29	1·5
10. Wool, noils, and waste,	1·36	3·3	10. Tin,	·28	1·4
11. Wool tops,	1·26	3·1	11. Raw hides,	·27	1·4
12. Wool, sheep, lamb,	·55	1·4	12. Raw cotton,	·26	1·3
			13. Tin ore,	·22	1·1
			14. Bark for tanning,	·21	1·1
Total,	40·7	100	Total,	19·8	100

Combined total, £60·50.

but I would point out that cotton and other yarns in the aggregate make up by far the most important item, amounting to one-fourth of the total value of those exports. The German textile industry is, and always has been, to a very large extent dependent upon this country, at least for the finer cotton yarns, and, in the woollen trade, for those yarns which are distinguished as worsted. The cotton industry of Germany, for various reasons, including climatic ones, concerns itself chiefly with the production of the coarser yarns, and it is on that account that Germany imports such a large proportion of Indian raw cotton, which furnishes suitable material for that branch of the industry, finer yarns having long been becoming more and more the Lancashire specialty, and though these can to some extent be replaced from Switzerland, still the Swiss industry is far from being on a suffi-

ciently large scale to make good the deficiency. Worsted yarns are also a great English specialty, their production being carried on to a larger extent in Bradford than anywhere else in the world. It is an industry that involves great capital and a high degree of organisation, and nowhere else at the present time is that combination to be found to the same extent.

Table VI. shows the effect of the war in the case of a commodity of quite special importance in the industry and commerce of Great Britain. Coal-mining is the British industry that employs the largest number of people next to agriculture, and these, it must be remembered, nearly all men. Probably it is the industry in which the largest pro-

VI. Coal Exports, United Kingdom.

Quantity in Million Tons.

	July 1914.	Aug. 1914.	Sept. 1914.	Oct. 1913.	Oct. 1914.	Nov. 1914.	Dec. 1914.
Total, . . .	6·60	3·07	3·86	6·74	3·94	3·28	3·70
To Germany, . .	0·92	0·13	...	0·84	...	...	...
To Netherlands, .	0·14	0·17	0·28	0·17	0·11	0·07	0·09
To Norway, . .	0·17	0·25	0·23	0·20	0·20	0·18	0·18
To Denmark, . .	0·23	0·24	0·41	0·28	0·31	0·25	0·23
To Italy, . .	0·88	0·45	0·70	0·91	0·71	0·60	0·76
Bunker Coal, . .	1·92	1·15	1·33	1·89	1·46	1·25	1·25

Average Export Price per Ton.

	July 1914.	Aug. 1914.	Sept. 1914.	Oct. 1913.	Oct. 1914.	Nov. 1914.	Dec. 1914.
	sh.	sh.	sh.	sh.	sh.	sh.	sh.
Total, . . .	13·5	...	...	...	13·2	13·2	13·3
To Germany, . .	11·6	...	...	...	...	...	...
To Italy, . .	14·3	...	...	13·2	...	...	

portion of the value of the product is represented, at least at the pit-mouth, by the wages of those employed. As an article of commerce, while it stands among the leading exports in respect of value, it is incomparably the most important as regards quantity. It furnishes the cargo for much more than half the aggregate tonnage of laden vessels leaving the ports of the United Kingdom. For this commodity, as the table shows, Germany is one of the two leading markets. But the table makes it plain that great losses under this head have been suffered elsewhere also, and the nature of that loss is largely indicated by the last two lines in the table. Much of the coal sent to Italy is bunker coal, that is, coal designed for the use of steamers, and the great reduction in this export is an indication of the injury done by the war to ocean commerce generally as well as the manufacturing industry of many countries.

The export of herrings is a trade that greatly affects Scotland, and in particular the city of Aberdeen. The Baltic has always been the great external market for salted herrings, and Table VII. reveals how severely this trade has been hit by the virtual closing of that sea.

VII. United Kingdom Export of Cured or Salted Herrings.

Thousands of Cwts.

	July 1914.	Aug. 1914.	Sept. 1914.	Oct. 1913.	Oct. 1914.	Nov. 1914.	Dec. 1914.
Total, ...	1007	261	313	936	322	221	134
To Germany, . .	381	119	...	435	...	...	...
To Russia, . . .	588	106	186	343	92	0·4	0·4

Now look at Table VIII. showing the leading imports from Germany:—

VIII. United Kingdom Imports from Germany, 1913.

	mil. £	%	% imported direct in 1912.
1. Iron and steel, including pig-iron,	7·8	9·7	9
2. Sugar, refined, ...	6·2	7·7	180
3. Sugar, unrefined, . . .	4·7	5·9	102
Silks and half silks, . . .	2·4	3·0	
4. Machinery, ...	2·4	3·0	55
5. Grain, ...	2·2	2·7	
6. Woollens, ...	2·1	2·6	43
7. Cotton piece goods, . . .	2·0	2·4	32
8. Leather, ...	1·9	2·4	30
9. Cotton hosiery, ...	1·9	2·3	53
10. Chemicals, ...	1·9	2·3	6
11. Silk broadstuffs, ...	1·8	2·2	0·5
12. Coal tar dyes, ...	1·7	2·1	15
13. Electrical goods, ...	·9	1·2	
			% by different routes.
Total, . .	80·4	100	52·5 direct.
			33·0 via Netherlands.
			13·0 ,, Belgium.

I will enter for the present into no details so far as the first two columns are concerned, inasmuch as the more special considerations I have to lay before you with regard to them will be more conveniently dealt with after you have seen a subsequent table; but I ask you to notice the great importance of the iron and steel, sugar and chemical imports, including coal tar dyes. I wish, however, to draw your attention to the figures that you see in the third column and at the foot of the table. These give a very striking indication of the mode in which Germany carries on its trade, not merely with this country, but with other countries beyond the North Sea. In some cases, you will observe, only a very small proportion of the imports from Germany into this country

come to us directly from Germany, that is to say, from German ports. In 1912 more than 90 per cent. of the iron and steel imports and chemicals, excluding coal tar dyes, came to us through other countries, and the figures at the bottom show the routes by which this trade was really carried on, probably, you may say, by Rotterdam and Antwerp. The reason for that is obvious. By far the most important manufacturing region in Germany is that of the Ruhr basin and the Rhine, situated almost due east of Antwerp, and accordingly for the products of that region destined for this country, whether sent by water or by rail, one or other of these two ports, or some other Dutch or Belgian port (the Hook of Holland or Flushing in the one case, Ostend in the other), is by far the most convenient place for their dispatch. And of course it is obvious that the reverse holds good in the case of imports into Germany, although the tables of our commerce do not allow of our making a similar statement with regard to these. The importance of this consideration is enhanced when one bears in mind that the river Rhine may probably be described as, in the present circumstances, the most advantageous river for commerce in the world, and that that river is connected by waterways allowing of the use of barges of at least 1500 tons burden even with Antwerp. When this is considered one cannot but perceive how desirable must appear the possession of both the Netherlands and Belgium in the eyes of Germany. But it will be at the same time evident that, during the present war at any rate, the advantage of Germany lies in observing the neutrality of Holland. If that were once violated the Allies would then be in a position completely to stop all trade by means of the Rhine. According to the Rhine Act of 1868 all goods that arrive at Rotterdam on a through bill of lading for Germany, or sent to the ordinary merchant declaring that they are in transit, must be sent on across the Dutch frontier. Hence the care which the Allies have to take in seeing that all contraband, or conditional contraband, is stopped before reaching that port at all. The fact here referred to also makes clear what a vital thing it is for Germany to keep the war away from the Rhine, especially near the Dutch frontier.

There is no time to comment on the proportions of the different commodities imported direct into this country in most cases, but I must make an explanation with regard to the percentage put down in the case of sugar. What is meant by the figures you there see is that the total amount of sugar that comes to this country from German ports is considerably more than, in the case of refined sugar, about four-fifths as much again as that of German origin. The explanation of that is that the great sugar-growing regions of the continent which supply this country are Central or South-East Germany, and the Austrian province of Bohemia. Now these are regions that are inevitably served by the port of Hamburg, or perhaps also that of Bremen, both in any case German ports. A great quantity of the sugar that comes from Germany is of Austrian origin.

(To be continued.)

CORRESPONDENCE: THE RAINFALL REGIME OF AUSTRALIA.

Mr. H. M. Hunt, Commonwealth Meteorologist, sends us the following note in regard to the paper with this title which appears in vol. xxx. (1914), p. 527:—"The writer, Mr. B. C. Wallis, has arrived at a series of conclusions concerning Australia in his paper, which to a great degree duplicate those developed in the official *Climate and Weather of Australia*, by Hunt, Taylor, and Quayle. This appeared in 1913, and was reviewed in the *Royal Meteorological Journal* of April 1914. Mr. Wallis claims that his 'twelve monthly maps supply the only possible information about the rainfall regime of Australia.' In 1912 official rainfall charts were prepared *for each month*, and distributed to the various weather services of the world in March 1913. In these charts the data are based on sixteen years' record for every station, and on thirty years or more for the more important localities. The use of the pluviometric coefficient undoubtedly presents some points of interest, but it seems a roundabout method to use 'equipluves' to prove what is more easily demonstrated by simpler isopleths. The equipluve is based on a purely imaginary factor—one-twelfth of the average annual rainfall—which is but rarely approached in nature. It is considered that students will arrive at the conclusions reached by Mr. Wallis much more readily by means of such figures as 39 to 50 and 58 in the publication cited above.

"Exception is taken also to Mr. Wallis' remark that equipluves 'add to our knowledge of the desert areas.' There again we feel that he has not improved on the official charts. As shown in fig. 51 (*loc. cit.*) there are no rain gauges in a large part of the Australian arid region. But no indication is seen of any such lack of data in Mr. Wallis' twelve maps. Finally, it is thought that Angot's description 'relative raininess of the months' is much more to the point than the phrase 'lines showing equality of rainfall intensity,' with which, so far as we can judge, Mr. Wallis describes the same concept."

Meteorological Bureau,
Central Office, Melbourne.

December 1, 1914.

PROCEEDINGS OF THE ROYAL SCOTTISH GEOGRAPHICAL SOCIETY.

At the Meeting of Council held on Tuesday, January 19, the following were elected Ordinary Members of the Society:—

The Most Hon. the Marquess of Linlithgow.
Lady Ogilvy Dalgleish.
Capt. Thos. Robertson.
Mrs. J. Guthrie.
W. A. Paton.
W. Walker.
Mrs. A. Douglas Walker.
L. A. Davey.
J. E. Salvesen.
Miss J. R. G. Hastie.
Miss A. Gourlay.
D. E. Brand.
Mrs. Moore.
Miss Moore.
H. D. Fitzpatrick.

The following were elected Associate Members, viz. :—

Miss M. I. Keith.
Miss Maggie Cooper.
C. H. Cox, B.Sc., L.C.P.
F. W. Fraser.
J. Dalziel, M.A.
Miss E. Hogg, M.A.
Miss S. M'Gill, M.A.
Miss J. Mackirdy.
Miss Mary Mackirdy.

The Council desire to record their thanks to Mr. Andrew A. Gardner, Edinburgh, for his gift of valuable atlases and books.

GEOGRAPHICAL NOTES.

Europe.

Population and Products of Crete.—A recent *Diplomatic Report* gives some notes on this island which now, it will be remembered, is attached to Greece. It is pointed out that official figures in regard to the island have always been very slow in making their appearance, and those for the year 1912 are not yet available, but an attempt has been made to obtain all possible unofficial statistical data for the period 1912-13. It is a remarkable fact that during the year 1912, despite the continuance of the Italo-Turkish war and the beginning of the Balkan campaigns, yet both imports and exports showed an increase. This was apparently due to the fact that the olive crop in 1911 had been an unusually good one, and as the oil is the chief export of the island, a good year increases the purchasing power of the people, as well as the amount of the product. The Greek Government is devoting attention to the improvement of methods both of olive culture and of oil production. Iron presses and iron tanks are beginning to take the place of the older wooden structures, and a Government college and factory has been established at Candia. As compared with 1912, the following year was much less prosperous, partly because of the poor olive crop in 1912, and partly because of the economic disturbance owing to the war, and also to the lack of labour due to the same cause. There is indeed a chronic lack of labour, owing to the frequency of emigration, and the Greek Government have enacted a temporary law, forbidding males between the ages of 17 and 42 from leaving the island.

The latest population figures date from 1911, and give a total of 336,000, in round numbers. Candia and Canea are the only two considerable towns, and have populations of 25,000 and 24,000 respectively. It is estimated that some 2000 persons emigrate each year.

As already indicated olive oil is by far the largest article of export, averaging about a quarter of a million pounds in value yearly. Raisins and carobs follow, and the export of wine and soap is also considerable. The United Kingdom is the largest customer for oil, being followed in order of importance by Egypt, Austria-Hungary and Greece. Most of the ships which visit the island sail under the Greek flag, those of Austro-Hungarian nationality come next, and all other nationalities contribute an insignificant number to the total.

Earthquake in Italy.—On January 13 an extraordinarily destructive earthquake took place in central Italy, the epicentre being apparently close to the town of Avezzano. The loss of life here is stated to have been 90 per cent. of the total population of 11,000, while in some neighbouring villages almost every inhabitant was killed. According to Dr. Davison this fearful death-roll was due, not so much to the severity of the shock, as to the faulty construction of the houses in the region affected, which is not one where earthquakes are as a rule either frequent or severe. The area of perceptible damage to buildings extends almost across the peninsula, from Rome on the west to Chieti on the east, places 110 miles apart, while the shock was recorded at many distant observatories, including those of the Isle of Wight and of Washington.

Pan-Germanism and Denmark.—Before the outbreak of war Dr. Schütte sent us a pamphlet written by him with the above title, published in English at Copenhagen, a pamphlet to which recent events have given an added interest. It contains a number of quotations from Pan-Germanic literature, which set forth with extreme frankness the motives which, apparently, direct the actions of some Germans occupying prominent positions, and find their natural consequences in the present conflagration. Thus the periodical *Heimdall*, the official organ of the Pan-German Language Association, has on its title-page the motto, in Runic characters—"From the Skaw to the Adriatic! From Boulogne to Narva! From Besançon to the Black Sea!" In the volume for 1901 there appeared an article containing the following words:—"It is very doubtful whether the Germans of the empire would find more sympathy in Switzerland and Luxemburg, etc., than in Denmark, and yet these countries must also in the future be regained for Pan-Germany. We must familiarise ourselves with the thought that we may possibly have to use force in re-uniting the many scattered fragments of the Mid-European German area into one original whole. Schleswig-Holstein and Hanover have been incorporated with Prussia by means of force, and in the same way Alsace has been won for the empire. After they have been forcibly united with the empire, the conquered will gradually acquire the spirit of members of the new confederation, and will cease to desire separation. We do not anticipate too much success in an attempt to establish the Pan-German empire by peaceful methods." The above is taken from an editorial article. In another editorial, published in 1908, and discussing the German west frontier, it is stated that after the Germans have annexed the Netherlands, the French Meuse districts, French Lorraine, Franche-Comté, and the area of Besançon, the French inhabitants should be turned out and replaced by Germans. The same volume contains an appeal for the support of *Heimdall*, which is signed by Professor Paul Langhans, editor of *Petermann's Mitteilungen*, and by other professors and public personages in Germany and Austria. Dr. Schütte's pamphlet contains a number of other interesting quotations from Pan-Germanic literature, with discussions of various points connected therewith, more especially in relation to the Danes of Schleswig-Holstein.

Asia.

The Occupation of Basra.—The capture of Basra or Busra, the chief port of Bagdad, by an Indian force, was announced some time ago in the daily press, and is an event of some importance. The *Journal* of the Royal Society of Arts for January 1 gives some notes in regard to the port. It is expected that it will form the terminus of the Bagdad railway, and perhaps also the eastern objective of the proposed trans-Arabian railway from Port Said to the Persian Gulf. The town is unhealthy, but the neighbouring country is fertile, producing wheat, rice, dates, barley, much fruit, notably apricots, apples, figs, olives, pomegranates, and grapes, also vegetables, while roses are cultivated for attar. The trade in petroleum, to which considerable importance is attached, dates only from the beginning of 1914. The imports are considerable, German returns giving them as close upon £2,000,000 (for Basra and Bagdad) for the year 1913, as compared with about half that sum in the previous year.

Africa.

The British Protectorate of Egypt.—On December 17, 1914, it was announced that from that date Egypt was placed under the protection of His Britannic Majesty, and will henceforth constitute a British Protectorate. The official statement goes on to say that "the suzerainty of Turkey over Egypt is thus terminated, and His Majesty's Government will adopt all measures necessary for the defence of Egypt and the protection of its inhabitants and interests." The former Turkish viceroy, the Khedive, has been replaced by a Sultan, and a High Commissioner for Egypt has been appointed by the British Government.

Lake Nyasa and German Nyasaland.—Gisela Frey has written a prize essay on this subject which is published as *Ergänzungsheft* No. 10 of the *Mitteilungen a.d. Deutschen Schutzgebieten*, and is illustrated by a fine series of maps, topographical, geological, botanical, and so forth. The work is of the nature of a compilation, and gives full references to the literature of the subject. It includes a general account of the lake which, it will be remembered, is regarded as lying in a part of the Great Rift valley of Africa, and also a detailed description of that part of its shore which forms German territory. Among the more interesting points dealt with are the natural resources of the region and the modes of land utilisation practised. The natives, who are of Bantu stock, are predominantly agriculturists, with the exception of those who dwell close to the shore, who are primarily fishers, carrying on some supplementary agriculture. The nature of the agriculture carried on, however, and the extent to which it is combined with cattle-rearing, varies considerably in different districts, and it is further noteworthy that most of the coastal peoples carry on an extensive manufacture of pottery, the alluvial deposits at the mouths of the rivers furnishing the raw material. There is also a local iron industry, and the products of both

industries enter into local trade. Cultivation is carried on by means of the hoe, but the fields are well cleared, well kept, and both irrigation and drainage are practised in simple form. Only in Konde Land, where many cattle are kept, do the natives manure their fields. The usual African crops are grown, notably maize, rice, millet (especially sorghum for a local drink), beans, manioc, sweet potatoes, and, where the climate is suitable, bananas. In some parts the bamboo is extensively cultivated to make native beer. Interesting is the statement that, owing to the initiative of German missionaries, wheat and potatoes are now being grown on an increasing scale. Both were introduced in 1905, and the cultivation of wheat especially is spreading in the region of the Livingstone mountains. The natives are being taught by the missionaries to make and to eat wheaten bread, and wheat is also raised for export to the neighbouring protectorates. In its commercial development, however, the region suffers greatly from the difficulties of communication with the coast, and from the fact that the adjacent British and Portuguese territories yield the same kinds of products as German Nyasaland, so that extensive local trade cannot be developed. In addition to iron, copper occurs, and possibly gold: coal is also present, though it has not yet been successfully worked.

America.

The National Parks of the United States.—We have received three little pamphlets issued by the Department of the Interior U.S.A., and obtainable from the Superintendent of Documents, Government Printing Office, Washington, D.C., at a price of 10 or 15 cents each, which deal with various aspects of the scenery of two of the national parks of the States. The titles of the pamphlets are respectively—*Origin of the Scenic Features of the Glacier National Park*, *Glaciers of Glacier National Park*, *Fossil Forests of the Yellowstone National Park*, and each is admirably illustrated. All are popular in tone, though careful and scientific in treatment, and their object, we take it, is to explain to the general public the interest and scientific value of the national possessions, a purpose which they should fulfil admirably. Each booklet explains clearly the areas best worth seeing in connection with the particular subject dealt with, and gives a careful explanation of the causation and significance of the phenomena which can be observed. In the case of the glaciers of the Glacier National Park, it is stated that the account is preliminary, as the region has not yet been covered by the geological survey. The author, Mr. Wm. C. Alden, contrives, however, to find within the area illustrations of all the main glacial phenomena, and makes it clear what an admirable epitome of the subject is presented within the boundaries of the park. We note especially a very fine view of a *bergschrund*, one of the best we have seen, with a snow bridge in position. The photographs and discussions of the phenomena connected with the origin of cirques are also interesting, and it is clear that the park presents, as it were, an earlier glacial stage to that shown in our own Highlands. For example, the view of a "glacial staircase" in a

cirque, that is the occurrence of successive shelves at different levels, might almost be a winter scene in the Highlands, save that whereas in the Highlands the shelves are only occupied by snow, in the Rockies they still bear small glaciers. On the north side of Bidean, for instance, such rocky shelves are well seen, and the uppermost was found to be still drowned in snow at the end of last June.

We recommend the pamphlets to the notice of teachers, who will find in them interesting and well-illustrated accounts of certain scenic features, and also to that of millionaires, to whom the idea of a Scottish National Park, containing examples of the most striking features of Highland scenery, might suggest itself as being both desirable and practicable.

Cayman Islands (Jamaica).—A recent *Colonial Report* gives some notes on these somewhat remote islands, which are under the administration of Jamaica. On Grand Cayman the chief industry is the catching of turtle, and the making of the vessels in which the fishery is carried on. In the lesser islands coconuts are grown. The islands are inhabited by 5500 people, of whom 2300 are white, and the remainder black or half-breeds. In religion the inhabitants are stated to be predominantly Presbyterian. A curious point is that the imports (about £25,000) are more than double the exports (about £11,000). This is partly because the materials for shipbuilding figures in the imports table, while the vessels themselves are for the most part owned locally and not sold. Further, as the islands yield little, the males mostly emigrate to the United States, Central America, or the Panama Canal zone, and remit their earnings to their families. Attempts are being made to resuscitate the coconut industry in Grand Cayman and to grow cotton, but the inhabitants show a great want of enterprise.

Polar.

The Imperial Trans-Antarctic Expedition.—A telegram from Sir Ernest Shackleton, which appeared in the *Daily Chronicle* of January 12, states that the *Endurance* was sailing from South Georgia when the message was sent off, all on board being well. The expedition had been delayed by the unfavourable condition of the ice, and Sir Ernest does not expect to be able to cross the Antarctic continent this season.

General.

Obituary.—On January 15 Vice-Admiral Sir George Strong Nares died in his eighty-fourth year. Sir George Nares was chiefly known for two important pieces of exploring work; he commanded the *Challenger* during the first two years of that vessel's remarkable voyage of exploration, and he was selected by the Admiralty to command their Arctic expedition of 1875, for which purpose he was recalled from the *Challenger*. This expedition, on the vessels *Alert* and *Discovery*, left England in the spring of 1875, and the *Alert*, Sir George Nares' ship, wintered in 82

25′ N. lat., while a sledging party in the following spring succeeded in reaching lat. 83° 20′, the highest point attained then and till several years later, no very notable advance being made till Nansen's journey in 1895 (86° 13′).

Proposed Meteorological Conference in Edinburgh.—We noted here last year (vol. xxx. p. 206) the proposal to hold in Edinburgh last September a conference on meteorology and oceanography, of which the late Sir John Murray was to have been president. The outbreak of war naturally resulted in the abandonment of the conference, and Mr. E. M. Wedderburn sends us the following note in regard to the funds subscribed:—"The Executive Committee of the proposed Meteorological Conference at Edinburgh has handed over to the Scottish Meteorological Society the balance of the funds subscribed for the expenses of the meeting, with the hope that, when the opportunity once more arises, the Society will take the initiative in carrying the project into execution. It has been decided that the committees in London and Edinburgh shall be kept in being."

Personal.—It is announced that the American Geographical Society has awarded to Dr. J. Scott Keltie, Secretary of the Royal Geographical Society of London, its Cullum Gold Medal, the highest award for scientific work at the disposal of the Society. The medal was founded by the late General Cullum, and its first recipient was Admiral Peary, while among others to whom it has been awarded are Dr. Nansen, Captain Scott, Professor W. M. Davis, etc. The award has been made to Dr. Keltie on account of his long and valuable services to the cause of geographical science.

Foreign Geographical Journals.—The Society has obtained from the Home Office a special permission to import scientific journals from enemy countries, and it is hoped, as a result, that the more important German and Austrian periodicals will reappear in our library at an early date. As these can only be obtained through neutral countries a certain amount of delay is inevitable during the continuance of the war. Our supply of French journals is increasing but is still small, suggesting that not all have resumed publication.

EDUCATIONAL.

Map Building.—Maps and charts are symbolical epitomes of geographical information. Prepared with the aid of the explorer, surveyor, oceanographer, meteorologist, etc., they serve as the basis of all the later work of the geographer. They represent in a language of line, colour, and symbol, volumes of history, travel, and scientific research, and are to the geographer, administrator, commander, navigator, engineer, and others, what the score is to the musician. To the trained eye the more elaborate maps reveal in a few inches, in a few

minutes, and probably with more accuracy, what otherwise can be conveyed only by page after page of description and explanation. The great advantage of the method is that all the facts are presented simultaneously and in their proper relation.

In school geographical teaching maps are of use mainly for training the imagination, the memory, and the powers of observation, comparison, and reasoning. By means of the regular and intelligent use of the atlas the pupil soon learns to visualise the relative positions and areas of the various countries, their configuration, the distributions of their vegetation, minerals, industries, and populations. The comparison of the map showing configuration with that of trade routes, or of the map of climate with that of vegetation, and the tracing of the relations existing between them are most valuable exercises in observation and reasoning. The frequent drawing of all kinds of maps, which need not necessarily be works of art, is undoubtedly one of the best means of impressing geographical facts upon the memory, and a well-planned series of maps drawn in class during the geography lesson should not only present various bird's-eye views of geographical information, but also illustrate the general principles underlying the scientific study of geography.

The tracing of many maps on semi-transparent paper seems to effect better results than the antiquated method of attempting to "pack" all the information into one elaborate and, presumably, untraced map. The short time required in the preparation of outlines, the concentration of the attention upon the correct forms and positions only, and the easy and interesting demonstration of cause and effect by superposition are but a few of the advantages accompanying the "tracing method." The pupils bring at least four outline maps of the country under consideration, and they are "built" in class, the teacher leading on the blackboard as the lesson proceeds. Although outlines drawn on the blackboard or on brown paper by the pupils, in turn, before the commencement of the lesson, have not all the advantages of the published blackboard outline map atlases, they serve the purpose admirably.

The first map should show the physical features, and the method of indicating the configuration will vary according to the age of the pupils. In the climate map the various regulating factors, *e.g.* prevailing winds, currents, etc., should be inserted in addition to the temperature and rainfall. As regards latitude and longitude (at least in the junior classes) there need be shown only two enclosing lines of each, together with any others of importance, *e.g.* the Tropics. These must be memorised. The map of vegetation should be built up by reference to the preceding two. Separate maps may be prepared for animal and mineral distributions, according to the amount of detailed information required; others showing the industries, distribution of population, etc., will follow, attention at all times being directed to the dependence of the various distributions upon the facts demonstrated in the previous maps.

Even in a brief note on map-building, reference must be made to the use of symbols. If facts are to be presented in such a way as to "catch the eye" other means than condensed masses of names must be

adopted, and, in order that the symbols may be as suggestive as possible, it is recommended that they be selected by the pupils themselves. For instance, in the first map rivers and their names might be shown in blue ink, mountains in brown ink, and so on. In congested regions this prevents confusion and saves much time. Seasons of rainfall may be indicated in various ways. But it is in the production map that the system may be employed to the greatest advantage. The following gives an indication of a scheme of symbols suggested by pupils, and used by them for several years with creditable results. The reasons for their adoption will in most cases be apparent. Various arrangements of yellow indicate cereals, *e.g.* dots for maize, crosses for oats, plain yellow patches for wheat, etc., brown dots represent tea, circles are used for cocoa, plain brown for coffee. Good grass is indicated by green patches, poor by green strokes, and scrub by green dots. Numerous combinations of a similar nature at once suggest themselves. In the case of products that are found but rarely, the names are inserted. It goes without saying that in order to obtain the maximum of benefit the same system of symbols should be employed throughout the whole course.

When completed the maps ought to be mounted, in their natural order, on white paper. They then present to the eye in a most vivid manner a comprehensive and rational arrangement of geographical data.

Altogether, the method is one which appeals strongly to the pupils. The maps, being their own handiwork, are of more than ordinary interest to them, and the care bestowed upon their preparation is justified, not only by the good results obtained from a rapid revision before examinations, but more especially by the fact that in their execution and use the pupils cannot fail to obtain a fairly sound knowledge of geographical principles.

J. HUTCHEON.

NEW BOOKS.

EUROPE.

Fraserburgh: Past and Present. By JOHN CRANNA, Harbour Treasurer. Aberdeen: The Rosemount Press, 1914. *Price* 6*s.* 6*d.*

We are always glad to welcome a book of this nature, a careful, loving and well-informed contribution to local history. A "regional survey" is not a sufficient description of the work, for though it includes the elements which we look for in such a geographical description—and we use the term in its widest and best sense—it gives us far more. The *personalia* and the history of the evolution of the burgh lend it a special interest, and Fraserburgh is to be congratulated upon possessing an official at once so enthusiastic and so competent to record its fame.

The present town of Fraserburgh was founded by Sir Alexander Fraser of Philorth in 1588, but references to the natural features of the district are alleged to occur in the writings of Ptolemy, and there is ground for supposing that it was visited by the Emperor Severus. But we have to stride onward to the year 1370 before we find records of a village community on the present site of Fraserburgh.

From that time forward there are many incidents—*e.g.* the wreck of the *Edward Bonaventure* in Queen Elizabeth's days, and the rescue from the disaster of the first Russian Ambassador to England. Nor did the grant of a Royal Charter bring quietude, as can be well understood from the general history of Scotland before and after the Union of the Crowns. To-day, the population of Fraserburgh exceeds 11,000, and it counts as its most distinguished living native, the Treasurer of the Bank of Scotland.

Mr. Cranna's volume is replete with local family history and social incident drawn from the burgh and kirk-session records and other sources. The chapter on the herring-fishing industry is specially interesting, and the procession of the "Burry Man" (a man whose clothes are encrusted with burrs) to propitiate the gods who guide the ways of herrings makes curious reading. The Burry Man was last seen in 1864, when his efforts proved such a failure that he has not reappeared. The volume is bulky, and some of it appeals chiefly to "Brochers." Still we have no hesitation in commending it to the attention of the general reader. It is well illustrated and well produced.

Urquhart and Glenmoriston: Olden Times in a Highland Parish. By William Mackay, LL.D. Second Edition. Inverness: The Northern Counties Newspaper and Printing Co., 1914. *Price* 10*s.*

We are pleased to see that a second edition of this work has been called for. The first edition was warmly welcomed in these pages (vol. x. p. 382), and although the suggestion then made that a map of the widespread parish might be added has not been given effect to, that is a small blemish in a volume of so much interest and such wide erudition. As was emphatically said in the former review, "the volume is a mine of wealth to all interested in the Highlands, and a better book on the subjects treated of must be hard to find." We note with pleasure that the new occupant of the Gaelic Chair in our University has lent his valuable aid in this edition.

Story and Song from Loch Ness-Side: Being principally Sketches of Olden-Time Life in the Valley of the Great Glen of Scotland, with particular reference to Glenmoriston and Vicinity. By Alexander Macdonald. Inverness: *Northern Chronicle*, 1914. *Price* 5*s.*

A native of Glenmoriston, and a true Celt, Mr. Macdonald has devoted pious care to gathering and recording the old customs, tales and songs of the district. Some of the last have never before been published. Nearly all in the book are in Gaelic, and as translations into English are rarely given, the appeal of the book is thus restricted. Still it contains much that is of interest to persons outside the district, and Mr. Macdonald deserves well of his countryside. The life there, as set forth by him, is typical of what it has been and still is in many other parts. Mr. Macdonald's evidence is largely first-hand, and we may specially mention the collection of Gaelic charms in case of sickness.

Peaks and Precipices: Scrambles in the Dolomites and Savoy. By Guido Rey, Author of "The Matterhorn," etc. Translated from the Italian by J. E. C. Eaton. With 76 Illustrations. London: T. Fisher Unwin, 1914. *Price* 10*s.* 6*d. net.*

But for the numerous and excellent photographs and the titles of some of the chapters the average English reader would frequently find himself in difficulties as to what this book really is about. We know from the sub-title that the author

climbed some of the Mont Blanc aiguilles as well as two or three of the peaks in the Trentino, and we know also that he is a distinguished and experienced mountaineer, but any one who expects to find a description of various remarkable ascents will be disappointed. We have, however, what must be a very complete and exhaustive record of the author's sensations, thoughts and feelings—a psychological diary in fact—couched in sympathetic and nervous language and permeated with that charming unconscious egotism which is characteristic of our Latin cousins. He has no doubt whatever that the reader is interested in what the author thinks even more than in what he does. Here and there is a touch of that callousness which, being also unconscious, just stops short of cruelty, and which is another southern characteristic. On the south face of the Marmolada an accident occurred. The scream of a woman was heard. The scream is described with a wealth of imagery. Then instead of investigating the cause the author proceeded to set down in his note-book the torrent of oaths let loose by the leading guide! There was nothing else to do, he says.

The translation appears to be excellently done, and the book is in every way most sumptuous.

Fighting in Flanders. By E. Alexander Powell. London: W. Heinemann, 1914. *Price 3s. 6d. net.*

This remarkably opportune book by an American eye-witness of recent terrible events in Belgium will deservedly arrest public attention. Mr. Powell was the Special Correspondent of the *New York World*, and was accorded exceptional privileges by both the Belgian and German military authorities. He took with him "a little photographer from Kansas named Donald Thompson," and to him we are indebted for the numerous interesting illustrations from photographs throughout the volume. The author made Antwerp his headquarters, for at that time (August to October) it was the seat of the Belgian Government, and because from it any point on the battle front could be reached by motor car.

Mr. Powell describes how the Belgian authorities at Antwerp prepared for the siege by levelling to the ground all buildings and trees covering a zone round the city some three miles wide by twenty long, so that "certainly not since the burning of Moscow has there been witnessed such a scene of self-inflicted desolation." Property to the value of £16,000,000 was destroyed in a fortnight. Unfortunately, all this destruction proved of no use, for the Germans "pounded the forts to pieces with siege guns stationed a dozen miles away." The author's admirable descriptive powers enable us to realise the scenes he witnessed, such as the arrival in Antwerp on 25th August of the first Zeppelin which bombarded the city, causing incredible destruction and loss of life.

Mr. Powell undertook, by request, a daring mission to motor from Antwerp through the German lines to Brussels with a message for the American Minister, Mr. Whitlock, who could not otherwise be communicated with. He passed through Aerschot, which he found in ruins after a German "orgy of blood and lust." He found Louvain "another scene of destruction and desolation," and he adds, "The amazing feature of it all was that, among the Germans, there seemed to be no feeling of regret, no sense of shame."

The author was invited to dine with General von Boehn, Commander of the 9th German Army, in order that he might receive, for the American press, the German version of the incidents just referred to. He describes the march of this enormous Army, "the very flower of the German Empire, including the Imperial Guard," and mentions that every commissioned and non-commissioned officer was provided

with better maps of Belgium than the Belgian General Staff possessed. He also noticed an officer repeatedly lash a sentry's face with his riding-whip because the man did not salute him promptly enough. Mr. Powell's cross-examination of General von Boehn in regard to the atrocities committed by the German soldiery is worth reading. The General's defence utterly broke down. However, not only were the author and General photographed together (as the frontispiece shows), but the author's companion Thompson was permitted to take photographs of the German army on the march.

Mr. Powell was in Antwerp on 4th October when Mr. Winston Churchill suddenly arrived in a motor car, and assured the Burgomaster that the British would save the city. The Royal Marines and Volunteer Naval Reserve, some 8000 strong, followed, and "were as clean-limbed, pleasant-faced, wholesome-looking a lot of young Englishmen as you would find anywhere," but, the author adds, "they were not first-class fighting men" as they lacked equipment and experience. Yet they held the trenches "for three days under as murderous a shell fire as I have ever seen, and then fell back in perfect order." Antwerp succumbed at last before the vast German Army and its irresistible guns: but the Belgians had won the heart of the author. "Do you wonder," he asks, "how they captured my imagination? I am pro-Belgian; I admit it frankly. I should be ashamed to be anything else."

AFRICA.

On the Congo Frontier: Exploration and Sport. By Major E. M. Jack, R.E. With 44 Illustrations and a Map. London: T. Fisher Unwin, 1914. *Price* 10*s.* 6*d. net.*

Major Jack was first a member of the Anglo-Belgian commission for settling the boundary between Uganda and Belgian Congo; then he assisted in the measurement of an arc of the 30th meridian in the same region, and thirdly he was in command of the party engaged in delimiting the boundary between Uganda and German East Africa. The first two duties were performed in 1907, and the third in 1910. To a student of geography no genuine book of travel is valueless, and nearly all books on Africa are of interest, but we congratulate Major Jack upon a volume which is worthy of a place among the best literature that exploration in Africa has produced. It is not long—some 300 well-printed pages—but it contains a little of everything—topography, geology, natural history, ethnology, and so forth—and yet it is not scrappy. We imagine also that the author's training as an engineer ensures accuracy, but, while there is a complete absence of padding, the narrative flows on with a graceful ease that is most enviable. The account of the Mufumbiro volcanoes, which the author claims as the true "Mountains of the Moon," adds greatly to that in the report of the Duke of Mecklenburg's expedition. Of the eight volcanoes composing the group, the highest, Karisimbi, 14,780 feet, is a cone permanently snow-covered. On Mount Sabinio, described by Major Jack as a "rocky and inaccessible summit," the frontiers of Britain, Belgium, and Germany meet. The word "inaccessible" will surely awaken the ambition of some mountaineer with time and means to attempt the conquest. In the preface the author explains that the word "Nyanza" simply means an unfordable piece of water, which may be a broad river, marsh, or lake. He therefore suggests its abandonment in place-names, and the use of Lake Victoria for the Victoria Nyanza. This seems quite reasonable. One recommendation only can we make for adoption in a subsequent edition of this excellent book. The name of the Duke of Mecklenburg appears several times in the text, but only once in the index.

AMERICA

The Ascent of Denali (Mount M'Kinley). A Narrative of the First Complete Ascent of the highest peak in North America. By HUDSON STUCK, D.D., Archdeacon of the Yukon. Illustrated. London: Bickers and Son, Ltd., 1914. *Price 7s. 6d. net.*

In the preface to this book, as well as in the last chapter, the author pleads earnestly on behalf of the native name of the highest mountain in North America. Its companion peak—Mount Foraker on the maps—he names Denali's Wife, which is presumably a translation of the local name. We hope that this plea will not have been made in vain, and that the map-makers—for with them lies the final decision—will pay due heed. Still, remembering Mount Everest and other names in our own Empire, we are not hopeful. We have already reviewed (vol. xxx. p. 215) a book intitled *The Conquest of Mount M'Kinley* by Mr. Belmore Browne, whose party, however, did not really "conquer" the mountain, having been twice driven back when within a few hundred feet of the summit. Archdeacon Stuck, with three companions, did reach the highest point, and he has now published his experiences. A start was made in early summer before the snow was off the ground, and thus supplies were easily conveyed on sledges. The dogs were actually able to reach a height of nearly 12,000 feet, where an advance base camp was established. The next part of the ascent was up a snow ridge which had been shattered by an earthquake, and therefore presented great difficulties. These were eventually overcome, and the last camp pitched at a height of 18,000 feet. From this point the summit was attained with relative ease. The great enemy was the cold, the thermometer on the top registering on June 7, at about 2 p.m., 7° Fahr. A biting wind which blew from the north certainly cleared the air, but increased the discomfort of the party. Mr. Belmore Browne had previously disposed pretty effectually of Dr. Cook's claims to have climbed the mountain, but Dr. Stuck adds the last word. He proves conclusively that Dr. Cook could never have set foot upon the actual mountain, far less upon the summit, and that his grandiloquent account of the ascent was sheer romance.

The illustrations are wonderfully good, and there is a useful sketch-map, but, unfortunately, no index. Dr. Stuck is already well known as a devoted missionary in Alaska. His calling has led him to make many adventurous journeys, and he is fully entitled to the honour of the first complete ascent of Denali, a project on which he had set his heart. We cordially recommend this book to the general reader, and mountaineers also will find in it many points of interest.

Panama: the Canal, the Country, and the People. By ARTHUR BULLARD (ALBERT EDWARDS). Revised edition, with additional chapters. New York: The Macmillan Co., 1914. *Price in Great Britain, 8s. 6d. net.*

We reviewed this very interesting book in vol. xxviii. p. 330. The new edition brings the story of the Canal up to date, and there is also an additional chapter in answer to the question—Will it pay? a question which it is needless to say Mr. Edwards answers in the affirmative. In regard to the opening of the Canal, it is interesting to note that while the official trip was made by the Panama Railroad's steamer *Allianza* in June last, yet long prior to that vessels had bit by bit worked their way through the whole system, the first to do this being apparently the tug *Reliance*, which circumnavigated South America in 1912. In addition to the new matter Mr. Edwards has added a number of new illustrations, and we can only repeat our former hearty commendation of the book, which gives a stirring description of an

achievement of which the Americans have good reason to be proud. The real interest of the book to the geographer is that it is a record of the first successful attempt on the large scale to fit a tropical area to be the residence of men and women from the temperate zone. For it is important to note that not only were the conditions rendered suitable for white men, but deliberate, and apparently successful, efforts were made to induce the white employees to bring their wives and children with them, and that in a region which had previously been a byword for unhealthiness even among tropical areas. This does not of course prove that tropical regions generally can be peopled by white men without fear of deterioration, but it does dispose of one set of arguments by which the view that they cannot settle there has been supported.

Canada To-day, 1914. London: "Canada" Newspaper Co., Ltd. *Price* 1*s.*

This, the fourth issue of the Annual, shows various new features, among which the addition of a list of books dealing with Canada is important. Another year it would be well to add to this some information in regard to maps. The illustrations are very numerous and combined with the text give a good idea of Canadian activities and of the openings available for settlers in that country.

British Columbia. By Ford Fairford. With an Introduction by the Hon. J. H. Turner. London: Sir Isaac Pitman and Sons, 1914. *Price* 2*s. net.*

This handy little book is based upon official publications and contains a general account of the resources of British Columbia, illustrated by reproductions from photographs and a map. It will be found useful by the intending settler.

GENERAL.

Round the Wonderful World. By G. E. Mitton. Edinburgh: T. C. and E. C. Jack, 1914. *Price* 7*s.* 6*d. net.*

This is a well-got-up book of rapid travel, and seems to have been partly undertaken in the interests of a boy called "Jim." If it was not for its size, it might be useful for any one taking a similar trip round the world. Well-known places and countries flash past as in a cinema, Gibraltar, Naples, Port Said, the Nile as far as Wady Halfa, the Holy Land, Aden, Ceylon, parts of India, Burma as far as Mandalay and Maymyo, Penang, Singapore, Hong Kong, Shanghai, Japan, and Canada. As is natural with a traveller who passes hastily through a country, mistakes will occur. For instance, the author speaks of the "Cengalee," instead of Sinhalese, "The woolly-headed moormen in Colombo." These are descendants of the Arabs who first came to Ceylon in very early times from Arabia. They are all Mohammedans, and not woolly-headed, the very reverse, and one can fancy their indignation if any one called them so. In Burma every Burman as a rule becomes a monk, but no pressure is brought to bear upon the children by their parents. They become monks because other children do, and they remain so as long or as short a period as they like. The Burmese *Let Pet* or pickled tea is eaten as a condiment, with oil, but is not made from another kind of plant than the tea tree. It is made from the leaves of the real tree, cured in a particular way, and is eaten by the Shans, Karens and other native tribes. From these same trees tea such as we use is made, dried, and infused with hot water, and drunk by the Chinese, as in the provinces adjoining Burma no tea is made.

The author's young companion "Jim," with a young girl from the cargo

steamer they were descending the Irrawady in, had an adventure with a buffalo which might have cost them their lives, if it is true.

The book is well illustrated, and being in large print does not take so long to read through as one would suppose from its considerable bulk.

Appearances: Being Notes of Travel. By G. Lowes Dickinson. London and Toronto: J. M. Dent and Sons, 1914. *Price* 4*s.* 6*d. net.*

Mr. Dickinson held some years ago one of the Albert Kahn Travelling Scholarships, and these sketches are reprints of articles written during his journeyings, and contributed to the *Manchester Guardian* and the *English Review.* In his preface the author states that he has "chosen a title which may serve also as an apology. What I offer is not reality; but appearances to me." It is thus obvious that the book's prime appeal is not to the geographer, whose first concern is certainly with reality. Perhaps, however, it is good for him sometimes to turn from the special phenomena with which his science deals to the discussion of what Mr. Dickinson regards as profounder truths. These truths the author enunciates with infinite seriousness, and if the geographer is disposed to feel that a journey round the world and a volume of 230 pages seem hardly necessary in order to reach the conclusion that "the civilisation of India implies an outlook on life fundamentally different from that of the civilisation of the West," that perhaps only means that he and Mr. Dickinson look upon the world from different standpoints. Let him read this book then and learn about Reality and Appearances, the East and the West, Art and Culture, the character of the Englishman, and so on. In addition he will find much of more immediate interest to him in the short but often vivid description of scenes in the various countries visited.

A Geological Map of the Caucasus (with explanatory text). By Felix Oswald D.Sc., B.A., F.G.S., F.R.G.S. London: Dulau and Co., 1914. *Price* 15*s. net.*

The Geological Map of the Caucasus compiled by Dr. Oswald is on the scale of 1 : 1,000,000 (15·78 miles = 1 inch). Heights are given in English feet. Topographical detail has rightly been avoided, but the latest railways have been inserted.

The map shows very clearly by means of a well-chosen colour scheme the distribution of the old gneisses and pre-Carboniferous crystalline schists, the Carboniferous and other Palæozoic schists, the main divisions of the Mesozoic and Tertiary formations, and also the Quaternary and Recent deposits; the chief occurrences of extrusive and intrusive igneous rocks are indicated, different colouring and ornamentation being used to distinguish the acid, intermediate, and basic groups; and the present extent of glaciers and névé has also been mapped.

In the explanatory notes which accompany the map a concise resumé of the chief physical features and of the successive stages in the evolution of the mountain system is followed by a detailed outline of the geological succession. The lithological characters, fossils, and distribution of the sedimentary rocks are given in considerable detail, important points such as the exact stratigraphical horizons of petroleum and gas-bearing beds being clearly indicated. The nature and distribution of the metamorphic and igneous rocks also receive brief but lucid treatment.

The region between the Black Sea and the Caspian presents problems of absorbing interest, and the author is to be congratulated on the production of a map which will be welcomed, particularly by geologists and geographers interested in tectonic and economic geology.

A Century in the Pacific. Edited by James Colwell. With introduction by W. H. Fitchett, B.A., LL.D. London: Chas. H. Kelly, 1914. *Price* 21*s. net.*

The title of this substantial volume of 781 pages is rather misleading, as the greater part is devoted to a detailed history of the progress of Methodist Missions in the Pacific. A better designation would be "A Century of Methodist missionary enterprise in the Pacific."

Chap. i. is devoted to the Discovery and Settlement of Australasia by Europeans, and chap. ii. to the Geology of the South-western Pacific, which is described in popular and not erudite language. The biology and languages are sketched in the following chapters, and here must be noted the great service the missionaries have rendered to science in reducing to writing and classifying the many tongues and dialects of the Australasian archipelago. In the second or sociological section, comprising four chapters, sketches are given of the Maoris of New Zealand, the Australian aborigines, the Indians in Fiji, and the Asiatics in Australia, written by missionaries with expert knowledge derived from long residence. The book deals exhaustively with the missionary aspect of the Pacific islands from the point of view of one branch of the Christian Church, and very little is said about the work of other denominations, who certainly should be recognised in a work that has any claim to be considered comprehensive. The want of a map is a disadvantage where so many places are referred to. There is, however, a very complete bibliography, extending to over 35 pages, where the student will find copious references to the books and more important accounts of the subjects and places in the part of the world dealt with in this useful work.

Allgemeine Geologie: III. Die Arbeit des fliessenden Wassers. Von Dr. Fritz Frech. "Aus Natur u. Geisteswelt." Leipzig u. Berlin: B. G. Teubner, 1914. *Preis* 1 *M.* 25.

This forms one of the six small volumes into which Professor Frech's *Aus der Vorzeit der Erde* has now been divided, the title of the series having been changed to that given above. The booklet is devoted to the action of running water in a somewhat narrow sense, for the work of transport and accumulation receive very little attention, and the chemical action of rain-water is excluded. It consists of five sections, the first devoted to torrent action, the second to valley formation, which includes a discussion of the peneplain, the third to karst phenomena and the formation of caves, while the two final sections are devoted respectively to springs and ground water and to landslips and rockfalls. A striking feature is the excellence of the illustrations, and their entire relevance to the text, which they truly illustrate. Further, the value of the book to the geographer is greatly increased by the fact that it is concrete, not abstract; that is, actual geographical examples of the different phenomena mentioned are discussed. This gives especial interest to the first section, dealing with the torrential streams which the Germans call *Wildbäche* or *Muren*, where the examples described are mostly taken from well-known Alpine valleys. Further, the "taming" of these wild streams, a matter of practically no significance in our own country, but one of enormous importance in the Alps, is fully described, and there are some striking pictures of rectified and controlled streams, both before and after the growth of young brushwood, which is encouraged in order to check erosion. Professor Frech lays great stress on the flooding and torrential outbursts which are of such frequent occurrence in Alpine valleys, more especially when the glaciers at their heads show an advance or a retreat, such as in either case to block temporarily, in whole or in part, the normal drainage of the valley. As he points out, such outbursts must

have been of very great importance during the glacial period, when fluctuations of this kind were large and frequent. He believes that many of the features of the valleys are explained by such torrent action at the close of the glacial period. He emphasises similarly the period of retreat of the ice as one in which landslips on the grand scale must have been of frequent occurrence. We recommend the book cordially to the notice of geographers, who will find many facts of great interest in small compass.

Natur und Mensch. Von Professor Dr. Max Georg Schmidt. Leipzig u. Berlin: B. C. Teubner, 1914. *Preis* 1 *M.* 25.

This is another member of the same series as the book reviewed above. It discusses on general lines the relation between man and his environment, under three headings. In the first section the effect of the surroundings on the individual is considered, as regards food, clothing, dwellings, tools and weapons, occupations, and so on. In the second section the life of communities is considered, while in the final section the psychological characters of nations and races are discussed in relation to the homes of these. The book deals chiefly with generalities, and the analysis seems to us in many cases incomplete. But those interested will find here discussions of the reason why the Englishman likes roast beef in addition to plum pudding, why the ladies in Rembrandt's pictures wear gold chains and jewels, the North Germans like *Sauerkraut*, and of similar problems, all of which are treated very seriously. There are some striking illustrations, including reproductions of famous pictures.

BOOKS RECEIVED.

The Guide to South and East Africa, for the use of Tourists, Sportsmen, Invalids, and Settlers. With Coloured Maps, Plans, and Diagrams. Edited annually by A. S. Brown and G. G. Brown. 1915. Twenty-first Edition. Crown 8vo. Pp. liv + 695. *Price* 1*s. net.* London: Sampson Low, Marston, and Co., Ltd., 1915.

Friendly Russia. By Dennis Garstin. With an Introduction by H. G. Wells. Demy 8vo. Pp. 250. *Price* 3*s.* 6*d. net.* London: T. Fisher Unwin, 1915.

How Belgium Saved Europe. By Charles Sarolea, Ph.D., Litt.D. With a Preface by Count Goblet D'Alviella, and a Map of Belgium. Demy 8vo. Pp. x + 226. *Price* 2*s. net.* London: William Heinemann, 1915.

Thirty-Five Years in Russia. By George Hume. With Illustrations and Map. Demy 8vo. Pp. xxiii + 317. *Price* 10*s.* 6*d. net.* London: Simpkin, Marshall, Hamilton, Kent and Co., Ltd., 1914.

Belgium and the Belgian People. (The Nations of the War Series.) Edited by L. G. Redmond-Howard. Fcap. 8vo. Pp. 128. *Price* 1*s. net.* London: Simpkin, Marshall, Hamilton, Kent and Co., Ltd., 1914.

Guide to Rhodesia, for the use of Tourists and Settlers. With Illustrations, Maps, and Plans. Fcap. 8vo. Pp. xvi + 395. First Edition. *Price* 2*s. net.* London: Beira and Mashonaland and Rhodesia Railways, 1914.

The Balkan Cockpit. The Political and Military Story of the Balkan Wars in Macedonia. By W. H. Crawfurd Price. With Autographed Photographs and many illustrations by H.R.H. Prince Nicholas of Greece and the Author,

and specially drawn Maps of the Military Operations. Demy 8vo. Pp. xii + 369. *Price* 12*s.* 6*d. net.* London : T. Werner Laurie, Ltd., 1915.

The Home of the Blizzard. Being the Story of the Australasian Antarctic Expedition, 1911-14. By Sir Douglas Mawson, D.Sc., B.E. Illustrated in Colour and Black and White, also with Maps. 2 Vols. Royal 8vo. Pp. Vol. I xxx + 349 ; Vol. II. xiii + 338. *Price* 36*s. net.* London : William Heinemann, 1915.

The Elementary Geography. Vol. I. *A First Physiography.* (The Oxford Geographies.) By F. D. Herbertson, B.A. With 23 Illustrations. New and Enlarged Edition. Crown 8vo. Pp. 96. Oxford : Clarendon Press, 1911.

Presented by the Hon. Gladys Graham Murray.

Geology of To-Day : A Popular Introduction in Simple Language. By J. W. Gregory, F.R.S., D.Sc. With 58 Illustrations and Diagrams. Demy 8vo. Pp. 328. *Price* 5*s. net.* London : Seeley, Service and Co., Ltd., 1914.

A Camera Actress in the Wilds of Togoland. The Experiences and Adventures of a Cinematograph Actress in West African Wilds. By Miss M. Gehrts. With an Introduction by Major H. Schomburgh, F.R.G.S. Demy 8vo. Pp. xx + 316. *Price* 12*s.* 6*d. net.* London : Seeley, Service and Co., Ltd., 1914.

Roman Britain in 1913. By Professor F. Haverfield. (The British Academy Supplemental Papers II.) Medium 8vo. Pp. 59. *Price* 2*s.* 6*d. net.* Oxford : University Press, 1914.

A Journey to Java. By M. M'Millan. With 34 Illustrations. Demy 8vo. Pp. x + 286. *Price* 7*s.* 6*d. net.* London : Holden and Hardingham, 1914.

Universal Gazetteer and Geographical Dictionary. With Numerous Maps and Plans. By John Thomson. Edinburgh, 1842.

Description of the Abbeys of Melrose and Old Melrose, with their Traditions. By John Bower, Junior. Kelso : A. Leadbetter, 1813.

A New Geographical, Commercial, and Historical Grammar, and Present State of Several Empires and Kingdoms of the World. 2 Vols. Edinburgh : G. Caw, 1802.

Presented by Mr. A. A. Gardner, Edinburgh, 1915.

An Almanack for the Year of our Lord 1915. By Joseph Whitaker, F.S.A. Crown 8vo. Pp. v + 1049. *Price* 2*s.* 6*d.* London : Joseph Whitaker, 1914.

The Slav Nations. By Srgjan Pl. Tucić. English Translation by Fanny S. Copeland. Fcap. 8vo. Pp. 192. *Price* 1*s. net.* London : Hodder and Stoughton, 1915.

From Heligoland to Keeling Island. One Hundred Days of Naval War. By Archibald Hurd and H. C. Bywater. Fcap. 8vo. Pp. 215. *Price* 1*s. net.* London : Hodder and Stoughton, 1915.

The Campaign in Russian Poland. By P. C. Standing. Fcap. 8vo. Pp. 186. *Price* 1*s. net.* London : Hodder and Stoughton, 1915.

Asia in Pictures. By H. Clive Barnard, M.A., B.Litt. Containing Sixty Illustrations, thirty-two of which are Coloured. Crown 4to. Pp. 64. *Price* 1*s.* 6*d. net.* London : A. and C. Black, Ltd., 1915.

Progressive Portugal. By Ethel C. Hargrove, F.R.G.S. With 16 Plates and a Map. Demy 8vo. Pp. ix + 276. *Price* 6*s. net.* London : T. Werner Laurie, Ltd., 1915.

The Lower Amazon. A Narrative of Exploration in the little known regions of the State of Para, on the Lower Amazon, with a Record of Archæological Excavations on Marajo Island at the Mouth of the Amazon River, and Observations on

the General Resources of the Country. By ALGOT LANGE. With an Introduction by FREDERICK S. DELLENBAUGH. Demy 8vo. Pp. xxvi + 460. *Price* 10*s.* 6*d. net.* London: G. P. Putnam's Sons, 1914.

Highroads of Geography. Book VI. *The British Isles.* (The Royal School Series.) Fcap. 4to. Pp. 368. *Price* 2*s.* Edinburgh: T. Nelson and Sons, 1914.

War Time and Peace in Holland. By J. W. ROBERTSON-SCOTT. (Home Counties.) Demy 8vo. Pp. 1 + 357. *Price* 6*s. net.* London: William Heineman, 1914.

Travels in the Mogul Empire, A.D. 1656-1668. By FRANÇOIS BERNIER, M.D. Translated by ARCHIBALD CONSTABLE (1891). Second Edition revised by VINCENT A. SMITH, M.A. Crown 8vo. Pp. li + 498. *Price* 6*s. net.* Oxford: University Press, 1914.

Hazell's Annual for 1915: *A Record of the Movements of the Time.* Edited by T. A. INGRAM, M.A., LL.D. Thirtieth year of issue. Crown 8vo. Pp. lxix + 592. *Price* 3*s.* 6*d. net.* London: Hazell, Watson and Viney, Ltd., 1914.

Black's Travel Pictures: British Isles; The Mediterranean and The Countries of the Great War. Selected and edited by ROBERT J. FINCH, F.R.G.S. Large 8vo. 24 Plates each set. *Price* 10*d.* London: A. and C. Black, Ltd., 1914.

Lands Forlorn: A Story of an Expedition to Hearne's Coppermine River. By GEORGE M. DOUGLAS. With an Introduction by JAMES DOUGLAS, LL.D. With 180 Photographs by the Author, and Maps. Fcap. 4to. Pp. xv + 285. *Price* 16*s. net.* London: G. P. Putnam's Sons, 1914.

Report on the Administration of Bengal, 1912-1913. Calcutta, 1914.

The Geology of Caithness. Sheets 110 and 116. Memoirs of the Geological Survey, Scotland. Edinburgh, 1914.

The Official Year Book of New South Wales, 1913. Sidney, 1914.

The Burma District Gazetteer. 5 volumes. Rangoon, 1914.

Punjab District Gazetteer. 2 volumes. Lahore, 1914.

Central Provinces District Gazetteer. 5 volumes. Allahabad, 1914.

North-West Frontier Province Gazetteer. 3 volumes. Peshawar, 1913.

Bengal District Gazetteer. 4 volumes. Calcutta, 1914.

Sudan Almanac, 1915. Pp. 114. *Price* 1*s.* London, 1914.

Diplomatic and Consular Reports.—Trade of Hankow (5399); Leghorn (5400); Iquique (5401); Angola, Portuguese West Africa (5402); Paraguay (5403); Germany (5404); Koweit (5405); Formosa (5406); Baghdad (5407); Kobe (5408); Madagascar (5409); Martinique (5410); Lingah (5413); Hamburg (5414). London, 1914.

Colonial Reports (*Annual*).—Ashanti (812); Hong Kong (814); Malta (818); Northern Nigeria (812); Zanzibar (823). London, 1914.

Rainfall of India. Twenty-third Year, 1913. Calcutta, 1914.

Exploration of the Northern Canadian Rockies of Alberta and British Columbia. Preliminary Report of the Expedition of 1914. By MARY L. JOBE, A.M. Pp. 7. 1914.

Tasmaniani e Australiani: Hesperanthropus tasmanianus. By GIUSEPPE SERGI. Pp. 55. Roma: Rivista di Antropologia, 1913.

The Russian Problem. By PAUL VINOGRADOFF, F.B.A. Pp. x + 44. *Price* 1*s. net.* London: Constable and Co., Ltd., 1914.

Publishers forwarding books for review will greatly oblige by marking the price *in clear figures, especially in the case of foreign books.*

THE SCOTTISH

GEOGRAPHICAL

MAGAZINE.

SOME NOTES ON GLACIAL PHENOMENA IN THE NORTH-JAPANESE ALPS.

By Professor K. Oseki.

(*With Sketch-map and Diagrams.*)

For about twenty years our Japanese Alps have been well known to journalists and geographers, not only in Japan but also throughout the world, especially because their mountains have from the scientific—notably in connection with topography and glaciology—and literary points of view similar interesting characters to those of the European Alps. There is much difference of opinion regarding the occurrence of an Ice Age in Japan. In 1903 N. Yamasaki, Professor of Geography in the University of Tōkyō, believed that he had recognised traces of glaciation, moraines, and glacial striae in the North-Japanese Alps;[1] but M. Yokoyama, the palæontologist of Tōkyō, found no remains of a fauna indicating cold climatic conditions in the quaternary deposits in the vicinity of the Bay of Tōkyō, and in consequence he denied that the occurrence of a glacial period could be established.[2] K. Jimbō, the well-known mineralogist of the University of Tōkyō, has, in the geological conferences of the University of Tōkyō, repeatedly stated that all the phenomena on which Yamasaki based his conclusions could be regarded as having been produced by weathering. The Japanese alpinists, *e.g.* Tujimura,[3] on the other hand, have accepted the theories of Professor Yamasaki, and have frequently described corries, moraines, and other

[1] *Journal of the Geological Society of Tōkyō*, vol. ix., 1903. (Japanese.)

[2] "Climatic Changes in Japan since the Pliocene Epoch." *Journal of the College of Science, Tōkyō*, vol. xxxii., art. 5, 1911.

[3] "Were the Cirques in Japan formed by Glaciers?" *Journal of the Geological Society of Tōkyō*, vol. xx., No. 238-239, 1913. (Japanese.)

Sketch-map of the North-Japanese Alps.

1. Shirouma Dake, 2933 m.
2. Tsurugigatake, 2998 m.
3. Oyama, 2992 m.
4. Harinoki Dake, 2820 m.
5. Harinoki Pass, 2541 m.
6. Yakushi Dake, 2986 m.
7. Kuro Dake, 2970 m.
8. Gorō Dake, 2924 m.
9. Otenjō Dake, 2922 m.
10. Higashi Tenjō Dake, 2811 m.
11. Yarigatake, 3178 m.
12. Hodaka Dake, 3103 m.
13. Nakao Pass, 2094 m.
14. Iwō Dake, 2458 m.
15. Abō Pass, 1583 m.
16. Norikura Dake, 3026 m.
17. Ontake, 2185 m.

signs of glaciation. Yokoyama's views have been laid before the German public by Lepsius,[1] while Penck has identified corries and terminal moraines in photographs of the North-Japanese Alps which I have submitted to him.[2] H. Simotomai also has described recognisable evidence of glaciation from views of the North-Japanese Alps.[3] For my own part, I have four times had opportunities of examining the North-Japanese Alps, and have observed indubitable glacial phenomena on certain peaks. At the suggestion of Professor Penck I shall proceed to describe these briefly.

The North-Japanese Alps, or the Hida Mountains (see sketch-map), form the eastern marginal range of the Hida Plateau, which has an elevation of about 1000 m., and is the highest plateau of the Japanese islands. The rocks of the Hida Mountains and of the plateau have the same strike, from S.W. to N.E. in the south, while farther to the north they strike more towards the east: this strike cuts obliquely across the long axis of

Fig. 1.—Iwō Dake.

Sketch made Aug. 25, 1912, when direction of vapour was S. 75° W.

the mountain range, which is north and south. Both in a geological and in a topographical sense the Hida Mountains can be divided into two parts: a southern, principally volcanic, and a northern, which is composed mostly of palæozoic rocks. The line of division can be drawn through the Abo Pass, which is only 1583 m. high, and forms a deep incision in the mountain range. Volcanic mountains are confined to the southern portion of the North-Japanese Alps, with the exception of the lofty mountain Iwō Dake (Fig. 1), an active volcano 2458 m. high. If we include Iwō Dake also in the southern portion of the North-Japanese Alps, it is necessary to draw the division line through the Nakao Pass, which is 2094 m. high, and is not a conspicuous depression in the Alpine chain. On the surface of the much eroded palæozoic plateau in the southern area of the North-Japanese Alps there stands a group of volcanic cones, running in a north and south direction, the Norikura

[1] "Keine diluviale Eiszeit in Japan." *Geologische Rundschau*, iii. 1912, s. 157.

[2] "Die Formen der Landoberfläche und Verschiebungen der Klimagürtel." *Sitzungsberichte der königlich preussischen Akademie der Wissenschaften*, iv. 1913.

[3] "Die diluviale Eiszeit in Japan." *Zeitschrift der Gesellschaft für Erdkunde zu Berlin*, 1914, No. 1.

Group. The northern area of the North-Japanese Alps, on the other hand, has a greater elevation, and there are comparatively few traces of recent volcanic rocks. The name North-Japanese Alps is strictly applicable only to the northern part of the Hida Mountains, as only there have the scenery, the climate, and the flora a truly Alpine character.

In this region the most striking feature is the steep and precipitous easterly declivity; on this side lies the great Japanese trough, the fossa magna of Naumann, which, trending in a N.N.W. and S.S.E. direction, separates the two great tectonic arcs of Japan. A row of volcanoes, the Fuji chain, is connected with this depression, while on its margins are uplifted blocks forming various types of horst mountains.

The eastern slopes of the Hida Mountains are drained by three streams, the Hime Kawa, Takasegawa and Azusagawa. The two last-named arise in the interior, and after flowing through deeply incised valleys debouch into the Sai Kawa, which in its lower course is called the Shinanogawa. On the other side of the mountains the Jōgwanjigawa and Jinzūgawa take their origin; their valleys also are deeply eroded. The Kurobegawa flows parallel to the eastern face of the mountains to reach the Toyama Gulf. Many small streams flow from the southern part of the Hida Mountains to the Jinzūgawa and the Azusagawa, and the Kisogawa, with its tributary Mashitagawa, or Hidagawa, takes its course in a southerly direction to the Ise Gulf on the south coast.

With reference to the distribution of the different types of rock in this district, the following are the principal facts of importance. In the northern part of the area the rocks are Archæan, being mostly gneisses, but in the middle and southern parts of the Hida Mountains palæozoic rocks predominate (principally slates and hornstones), with ancient eruptive rocks such as granite, porphyry, and porphyrite. In the extreme south recent volcanic rocks occur, and they extend also into the northern part of the Hida Mountains.

In Japan there is no mountain that rises above the present snow-line. Even Fujisan, the Mount Fuji, 3778 m. high, has no permanent snow-fields. Small patches of snow last through the summer only in a few shaded and sheltered spots on the North-Japanese Alps. On the Hida Mountains the annual precipitation, mostly in the form of snow, is about 2500 mm. On the north-west side the rainfall is greater than on the south-east, where probably it is less than 2000 mm. As there are no meteorological stations in the mountains our information on these points is very incomplete; investigations of this kind have been carried out principally at some distance from the base of the mountains, as, for example, in the towns Matsumoto on the east, and Takayama on the west.

As already stated, the Hida Mountains can be divided into a northern and a southern portion. The former of these is subdivided into three parallel chains by the longitudinal valley of Kurobegawa and the aligned valleys of Takasegawa and Azusagawa. The three intervening ridges are (1) the western chain, or Tateyama chain; (2) the central chain; and (3) the eastern chain, or Otenjō chain. The central chain

is by no means straight or continuous, but consists of two ridges, between which lies the Harinoki Pass (2541 m. high). The part north of this pass might be called the Shirouma Dake Ridge, and the southern portion the Yarigatake Ridge. Accordingly we recognise the following subdivisions of the Hida Mountains:

A. Northern Hida Mountains (Main Chain).
  (*a*) Western Chain, or Tateyama Chain.
  (*b*) Central Chain.
    1. Shirouma Dake Ridge.
    2. Yarigatake Ridge.
  (*c*) Eastern Chain, or Otenjō Chain.

B. Southern Hida Mountains (principal part of the Norikura volcanic group).

I shall now describe the evidence of glaciation and the occurrence of a glacial period in the different subdivisions of the North-Japanese Alps.

(a) *Western Chain, or Tateyama Chain.*

The Tateyama chain, in which a renowned pilgrim shrine is situated, which is a favourite resort of tourists in summer, has more than ten

Fig. 2.—View from the Tateyama Hut (Murodo), looking eastwards.
(Sketch made Aug. 23, 1904.)

peaks above 2600 m. The principal peak, though not the highest, is Oyama, 2992 m., which Professor Yamasaki and I ascended in 1904. On the western slope, at an elevation of approximately 2500 m., we found a corrie in front of which two series of terminal moraines had been deposited. Fig. 2 is reproduced from a drawing by the author of this paper. Tsujimura has also (*Journal of the Geological Society of Tōkyō*, vol. xx., No. 239) given an instructive representation of the east side of the Tateyama chain up to Tsurugigatake, 2998 m., which shows clearly that this slope also is furnished with corries along its whole extent. In photographs which were taken last summer by my acquaintance, Mr. Tomono, I can recognise corries with complete certainty on

one of the Yakushi Dake. I have prepared a sketch (Fig. 3) from these photographs. It shows the east side of the ridge of Yakushi Dake

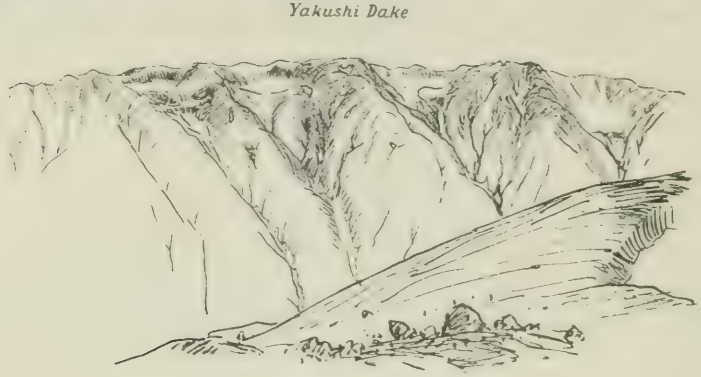


Fig. 3.—East side of the Yakushi Dake (2956 m.).

(2986 m.) facing the valley of the Kurobegawa. Four corries are visible, side by side, their floors having an altitude of about 2800 m.

(b) *Central Chain.*

1. In the northern part of the central chain, the Shirouma Dake Ridge, there are a number of summits over 2600 m. The problem of the glaciation of this group was raised in 1903 by Professor Yamasaki's

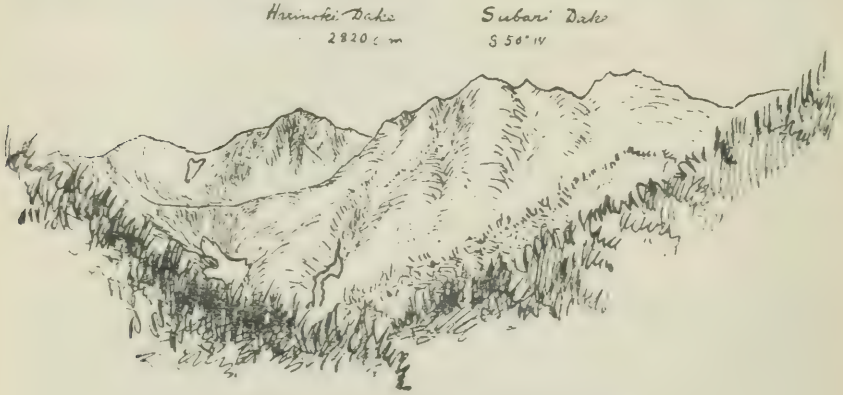


Fig. 4.—Corrie on the east side of the Harinoki Dake.
(Sketch made Aug. 21, 1904.)

investigation of Shirouma Dake, or Hakuba Dake (that is, White Horse Mount). He found moraines and glacial striae. A year later Professor Yamasaki and I, during a journey along the eastern slope (about 2520 m.) of Harinoki Dake, found a great corrie (Fig. 4), and ascended to its

threshold, when we crossed the Harinoki Pass. The floor of this corrie is saucer-shaped, and the very steep rock-walls of Harinoki Dake rise above it on the western side. We did not observe any glacial striæ during our hurried visit.

2. The summit peaks of the Yarigatake Ridge are higher than

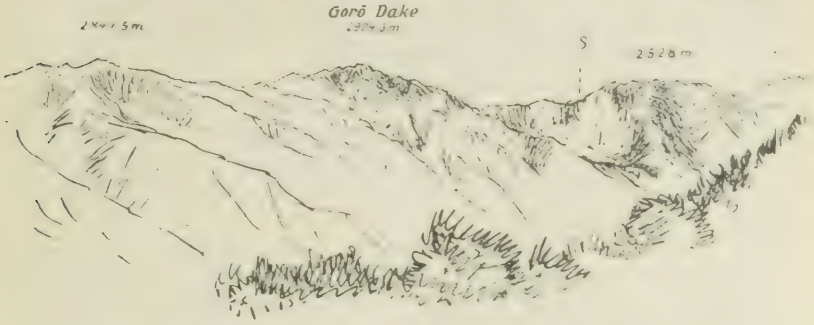


Fig. 5.—Corrie on Goro Dake. (Sketch made Aug. 22, 1904.)

those of the other group, and mostly have an elevation exceeding 2900 m. On Gorō Dake (2924 m.) Professor Yamasaki and I in 1904 saw a great corrie facing west, with a floor about 2540 m. level according to the provisional General Staff Chart (1 : 50,000). Fig. 5 repro-

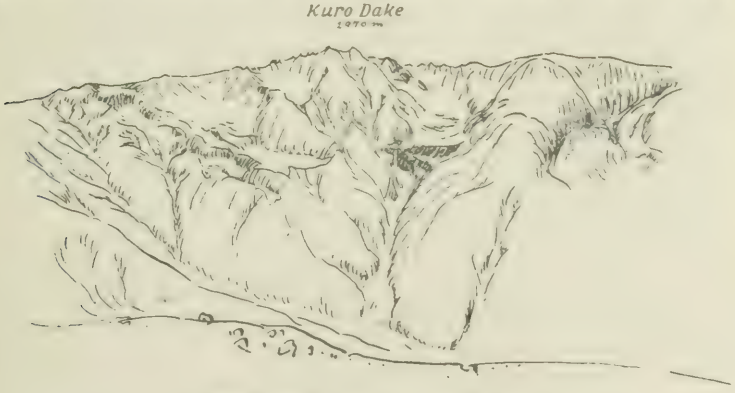


Fig. 6.—The east slope of Kuro Dake.

duces one of my drawings of this corrie, but unfortunately we were not able to enter it. Subsequently alpinists have discovered corries and moraines on other mountains. Fig. 6, from a photograph by Mr. Tomono, shows the east slope of Kuro Dake (2970 m), one of the peaks of a chain not far from Gorō Dake, and running parallel to it towards the north, separated by the valley of Higashizawa, a lateral valley of the Kurobegawa valley. In the centre of the view there is a great corrie, the floor of which descends by steps. From the chart I estimate the altitude at 2800 m. On the left there is a smaller corrie, on the right a

larger one, with a steep south side rising like a wall. The view is taken from the great corrie of Gorō Dake, already described, on the other side of Higashizawa.

Professor Penck has discussed the evidence of glaciation on the Yarigatake (3178 m.), which lies farther to the south. An inspection of the Yarizawa valley in the upper course of the Azusagawa, under the south-eastern slope of Yarigatake (the Spear Peak), reveals a ridge strewn with blocks which, according to Professor Penck, can be only a terminal moraine. Extensive snow-fields occur farther to the south in the group of jagged peaks known as Hodaka Dake (the highest summit, Oku-Hodaka Dake, rising to 3103 m.). Such snow-fields are not limited to this area, but very often occur also on the other high mountains in the North-Japanese Alps. For this reason we may also expect to find evidence of former glaciation.

Up to the present no traces of glaciation have been found in the eastern chain of the Hida Mountains which culminates in Otenjō Dake (Great Tenjō Dake), 2922 m. high. The Japanese General Staff Chart shows distinct corries on Higashi-Tenjō Dake (that is, eastern Tenjō Dake). In the southern Hida Mountains, also, where the volcanoes Norikura Dake (3026 m.) and Ontake (3185 m.) are situated, no evidence of glaciation is as yet known.

Summary and Conclusion.

1. Up to the present time evidences of glaciation in Japan have been obtained only from the occurrence of corries and morainic ridges in the northern Hida Mountains. Alpinists believe that in the South-Japanese Alps (the Akaishi Mountains and Kiso Mountains) the highest peak of which, Akaishi San, has an altitude of 3092 m., traces of glaciers have been detected, but I cannot confirm this from my own observations.

2. The traces of glaciation in the northern Hida Mountains are not very striking. During the glacial period small hanging glaciers must have descended to a level of about 2500 m. above the sea.

3. Moraines with striated boulders, striated surfaces, and roches moutonnées have hitherto not been identified with certainty in the corries. At the lowest point the elevation of the corrie-floors is about 2500 m. above sea-level, and it is to be assumed that this was the altitude of the snow-line during the glacial period. This is in accordance with the conclusions arrived at by H. Simotomai. As the highest peak of the mountain chain (Yarigatake, 3178 m.) does not reach the snow-line of the present day, we must conclude that the depression of the snow-line during the glacial period was not less than 700 m.[1]

[1] I learn from Japan that Professor Hettner found a large striated block of biotite granite in 1913. It occurs on the banks of the Azusagawa, at an altitude of about 800 m., at the eastern base of the Hida Mountains, in a deposit of stones. Very evident striae may be seen in a photograph of this "Hettner Rock," which has been sent me by Professor T. Kato in Tōkyō. If these are really of glacial origin we must conclude that a valley glacier, 40 km. long, must have occupied the valley of the Azusagawa. This is a far greater glacier than any that has hitherto been proved to have existed in Japan. Otherwise we must be prepared to believe in a transport of glacial blocks by floods, such as we can only regard as very exceptional.

THE RIO ROOSEVELT.[1]

THERE are still some unexplored parts of the globe where the boldest travellers may hope to distinguish themselves and benefit the world at large without the risk of being frozen to death or perishing for want of water. Colonel Roosevelt was exposed to neither of these dangers in his adventurous journey in an unmapped tropical wilderness, but he frequently emphasises the fact that while travel in Brazil is not dangerous from wild men or wild animals of the common kind, the implacable foes of all explorers are the swarms of venomous insects that infest its jungles, rivers and swamps, and mercilessly attack the traveller by day and night. "In these forests the multitudes of insects that bite, sting, devour, and prey upon other creatures, often with accompaniments of atrocious suffering, passes belief. The very pathetic myth of "beneficent nature" could not deceive even the least wise being if he once saw for himself the iron cruelty of life in the tropics" (p. 141).

Another terror was the small *piranhas* or cannibal fishes that infest most of the rivers in that region. He was first introduced to these vicious little brutes while ascending the Paraguay River on the way north to the head waters of the Amazon. They swarm in the Paraguay River and are sometimes 18 or more inches in length. "They are the most ferocious fish in the world. Even the most formidable fish, the sharks, or the barracudas, usually attack things smaller than themselves. But the piranhas habitually attack things much larger than themselves. They will snap a finger off a hand incautiously trailed in the water . . . they will rend and devour alive any wounded man or beast: for blood in the water excites them to madness" (p. 40). A case was related by Colonel Rondon, the author's Brazilian colleague, of a member of one of his former exploring parties who left camp on a mule which by and by returned without its rider. Following the track to a ford the party found only the skeleton of their late comrade inside his clothes, which were uninjured, every particle of flesh having been stripped off the bones by these ferocious creatures.

But there were many far greater hardships and dangers to be faced after the party had reached the watershed between Paraguay and Brazil, and begun their eventful journey down the Rio Duvida or River of Doubt, as this tributary of the Amazon was called up till 1914. The boundary plateau of Brazil and Paraguay is mainly a wide plain covered with grass or swamps and jungle, inhabited by primitive tribes who were quite friendly to the strangers. One of these, the Parecis Indians, gave an exhibition of their native game of "football," played, however, with the head only. A light, hollow, rubber ball is first butted by one player who has to throw himself flat on the ground so as to lift it into the air without touching it with hand or foot. It flies about from side to side like a tennis ball as each brawny head thus strikes it with wonderful dexterity. The game differed from British football in another important

[1] *Through the Brazilian Wilderness*. By Theodore Roosevelt. London: John Murray, 1914. *Price* 1*s. net.*

respect—there were no disputes between the players, of whom there were eight or ten on either side.

The great fall of Utiarity on the Rio Papagaio is briefly described (p. 188), and the author doubts if there is any fall in North America, after Niagara, that can rival this in volume and beauty. When this remote wilderness comes to be opened up one of the attractions for tourists will be found here, and doubtless the more commercial minded of the visitors will be impressed with the valuable source of energy that may one day be turned to good account in bringing about the better settlement of Brazil.

On February 27, 1914, the party, consisting of Colonel Roosevelt, his son Kermit, Colonel Rondon of the Brazilian army, a veteran explorer, and their staff of naturalists and servants, started down the River of Doubt into the unknown. This large tributary of the Amazon had never been traversed by white men, and its course was a mystery to geographers. They had seven dugout canoes, only three of which were good. The course of the river was surveyed by Colonel Rondon and Kermit with as great accuracy as was possible in the very difficult circumstances in which the party were often involved. It was the rainy season, and torrential storms constantly occurred. As they had no guides in an almost uninhabited region, covered, for the most part, with dense, dripping jungle, the number and size of the rapids and falls in front of them could only be ascertained by experience, and that of a very perilous kind. The heavy canoes with their precious cargoes had to be dragged past the worst places, where laborious portages were necessary. Some of them were lost and new ones had to be hewn from suitable trees. One of the men was drowned, and some of the others, including Kermit, had very narrow escapes. Another turned out to be a shirker and a thief, and ended by shooting a comrade against whom he had a grudge. The problem of how to deal with the murderer, at a time when food was running low and sickness was appearing, added to the troubles of the explorers, but in the end the culprit made off and was finally lost in the forest, to the great relief of his companions, who saw him no more.

The actual voyage down the River of Doubt occupied seven weeks. "Six weeks" (p. 304) "had been spent in steadily slogging our way down through the interminable series of rapids. It was astonishing before, when we were on a river of about the size of the upper Rhine or Elbe, to realise that no geographer had any idea of its existence. But, after all, no civilised man of any kind had ever been on it. Here, however, was a river with people dwelling along the banks, some of whom had lived in the neighbourhood for eight or ten years; and yet on no standard map was there a hint of the river's existence . . . For the first time this great river, the greatest affluent of the Madeira, was to be put on the map . . . and the clearing up of the complex problem of the sources of all these lower right-hand affluents of the Madeira was rendered possible by the seven weeks of hard and dangerous labour we had spent" (p. 306).

On April 26 the hungry, weary party, weakened by fever and covered with festering sores and the wounds of poisonous insects, reached the

mouth of the Castanho river where it is joined by the Aripuanan, and found themselves among friends and at the end of their exciting adventures. In honour of the occasion Colonel Rondon, the representative of the Brazilian Government, intimated that the river, whose upper part had hitherto been known as the Rio Dúvida, and its lower to a few rubber men as the Castanho, together with the lower part of the river known to the rubber men as the Aripuanan, were all parts of one and the same river, and that by order of the Brazilian Government this river, the largest affluent of the Madeira, with its source near the 13th degree and its mouth a little south of the 5th degree, hitherto almost unknown, had been named the *Rio Roosevelt*.

Colonel Roosevelt is a king among sportsmen, and a large part of his highly interesting narrative relates to the wild life of the region. He shot jaguars, pumas and a few tapirs, and his naturalist colleagues made large collections of rare birds and animals. His graphic narrative is illustrated with many admirable photographs, but the two small scale maps are unworthy of the rest of the book and convey only a hazy idea of the extent of the Rio Roosevelt. A single map on a larger scale showing the new river clearly marked as well as all the places mentioned in the text would be more useful than the two maps, which include considerably more ground than is necessary for the proper understanding of the whole route. The book might also have been accompanied by a few additional scientific details: thus the altitudes and more of the latitude and longitude observations than are referred to in the text might have been printed in an appendix. H. M. C.

SOME CONSIDERATIONS IN ECONOMIC GEOGRAPHY IN CONNECTION WITH THE WAR.[1]

By George G. Chisholm, M.A., B.Sc., Lecturer in Geography, Edinburgh University.

(*Continued from page* 93.)

Now look at the table showing the leading items among the total exports and imports of the United Kingdom.

Among the imports the first item is, and long has been, grain, the most important of these grains being wheat. Our own country, unfortunately, supplies us with only about one-fifth, or perhaps barely one-fifth, of our total requirements under that head. And it may be added that we depend either upon foreign countries or upon other parts of the British Empire for more than 40 per cent. of our supplies of meat in one form or other. These facts are sufficient in themselves to show the vital importance to us of maintaining the command of the sea.

[1] A Lecture delivered to the Royal Scottish Geographical Society on the 16th of December 1914.

IX. United Kingdom Trade, 1913.

Imports.	mil. £	%	Exports.	mil. £	%
			British Produce—		
1. Grain and flour,	85·5	11·1	1. Cottons, including yarn,	127·2	24·2
2. Raw cotton,	70·6	9·2	2. Iron and steel,	54·3	10·3
3. Meat,	56·7	7·4	3. Coal and coke,	53·7	10·2
4. Wool, total,	37·7	4·9	4. Woollens, including yarn,	37·7	7·2
Sheep, lamb,	34·2	4.5	5. Machinery,	37·0	7·0
5. Wood and timber,	33·8	4·4	6. Chemicals,	22·0	4·2
6. Butter and margarine,	28·0	3·6	7. Apparel, haberdashery,	13·5	2·6
7. Sugar,	23·1	3·0	8. Carriages, motor-cars, etc.,	11·4	2·2
Refined,	12·4	...	9. Ships,	11·0	2·1
Raw,	10·7	...	11. Linen manufactures, including yarn,	9·5	1·8
8. Rubber,	20·5	2·7	Total,	525·2	100
9. Oil seeds and nuts,	15·9	2·1			
10. Iron and steel,	15·2	2·0	*Foreign and Colonial—*		
11. Silk yarn and manufactures,	15·1	2·0	1. Rubber,	14·8	13·5
12. Hides, skins, raw,	15·1	2·0	2. Wool,	13·6	12·4
13. Tea,	13·8	1·8	3. Raw cotton,	9·1	8·3
14. Chemicals,	12·9	1·7	4. Hides, skins,	8·4	7·7
			Total,	109·6	100
Total,	769	100	Grand Total,	635	...

But the following tables showing wheat prices before and subsequent to the war, as well as meat prices in this country, will serve as sufficient indication of how well that command has been maintained.

X. Price of Wheat per Quarter, 1914.

	English Gazette price.	Import price, London.	Berlin.
	s. d.	*s. d.*	*s. d.*
July,	34 2[1]	35 6 (U. K.)	... ...
August,	36 6	36 1	48 2
September,	39 2	37 6	51 3
October,	38 10	41 4	54 9
November,	41 11[1]	43 8 (U. K.)	... ...

[1] Last week of month. Since the lecture was delivered, and especially since the close of the year, the rise in the price of wheat has been much more rapid. The average English Gazette price of wheat for the last week in December was 44s. 4d., that for the last week in January 1915 was 52s. 8d., and since then the rise has been even more rapid, the price of wheat having reached in some English markets 60s. per quarter, and upwards. Mr. Asquith stated in the House of Commons on the 11th of February that the price of wheat on the 1st of February in this year showed a rise of 72 per cent. as compared with the price at the end of July, and one of 66 per cent. as compared with the average February price for

XI. United Kingdom, Average Import Price of Meat per Cwt.

	Beef (chilled).	Beef (frozen).	Mutton (frozen).	Bacon.
July, ...	£2·08	£1·71	£2·13	£3·36
August, . . .	2·46	2·09	2·28	3·89
September, . .	2·78	2·47	2·33	4·03
October, . . .	2·62	2·71	2·47	3·96
November, . .	2·61	2·75	2·52	3·58

There has, indeed, been a rise in prices, and if that is a hardship for the country generally, we must bear in mind that no wars can be waged without hardships, and there is at least this consolation that the advanced prices may perhaps be the means of enabling our farmers to acquire some of that capital which has been lost in former years, and which is so badly required to promote that recovery of which I believe the dawn had begun even before this war broke out.

You will remember that the next item to grain among the imports into this country is raw cotton, and that cotton manufactures are, as they long have been, the leading exports from this country in point of value. Next to agriculture and mining, indeed, the cotton industry has for many years been the most important industry this country carries on, and it is an industry which, from a very early date in its history, has produced to a much greater extent for foreign markets than it does for the home market, which, I may remark, is a somewhat exceptional thing. For that reason it is an industry sure to be greatly affected by any disturbance of the trade of the country generally, and it will be of no little interest to compare the relation of the cotton industry to the trade of the country generally in the present war with that which obtained during the last great wars which convulsed the whole of Europe, those of the revolutionary and the Napoleonic epoch. It so happened that these last wars, which went on with little interruption from 1792 to 1815, took place exactly in the period when this country got the start of the whole world in the application of modern machinery to manufactures,

the previous three years. That of wheat or flour was 75 per cent. as compared with July, 66 per cent. as compared with the previous three years' average; that of home-grown meat 6 per cent. as compared with July, and 12 per cent. as compared with the previous three years, and that of foreign meat 12 per cent. as compared with July, and 19 per cent. as compared with the previous three years' average. The causes of the particularly rapid rise in wheat and flour are various. In the first place, it is certainly unfortunate that the year that has cut off the important supplies of wheat that we get from Russia should have yielded such a bad harvest in Australia that the Commonwealth has no surplus for export. Other causes have been the rise of shipping freights, the great shortage of labour at the ports, as well as the maintenance of a large home demand, lavish expenditure on the part of the Government in connection with the war having enabled the working classes and their dependants in this country to spend even more largely than usual on their food requirements. Mr. Asquith anticipates that after June this year there will be no shortage in the world supply of wheat, but even if this anticipation is correct it is not inconsistent with Broomhall's forecast, made at the end of January, of a scarcity of wheat in the United Kingdom within two or three months.

and it is not too much to say that it was largely the extraordinary development of the cotton industry that went on during that period that enabled this country to meet the burdens entailed upon us by that prolonged war. A few figures will serve to bring this fact into relief. In 1785, the year in which the first cotton mill driven by steam was erected in this country, the total import of raw cotton into this country was eighteen millions of pounds; in 1815, at the end of the war, it was ninety-two million pounds, insignificant figures indeed as compared with those of the present day, but still showing an extremely important growth at that time. In 1801 the official value of the cotton goods exported from this country amounted to seven millions sterling; in 1815 it was upwards of twenty-two millions, but it should be said with regard to these figures that they do not, in fact, give any information as to the value, inasmuch as the so-called official values presume that the price never varied from year to year, but they do give us information as to the important growth of the export trade, inasmuch as, for the reason just mentioned, these figures show the ratio of the quantities at the different dates. It was, in fact, largely due to the growth of this trade and the shipping connected with it that this country was enabled to increase its revenue from less than fifteen million pounds sterling in 1785 to seventy-two million pounds in 1815. The position in the present war, however, is entirely different. At the present day the United Kingdom is far from being the sole consumer of raw cotton. The industry has grown to considerable dimensions in all countries except the most backward. You have seen that in the consumption of raw cotton Germany comes next to our own country after that of the United States, and accordingly the instant result of the declaration of war was to make it obvious that there would be a great reduction in the demand for raw cotton. The effect of that, of course, was to make it certain that if trade in the raw material were allowed to go on through the ordinary channels, the price of cotton would be brought down to such an extent as to be absolutely ruinous to hundreds of those connected with the trade. Hence the cotton exchanges in Liverpool and the United States were at once closed, and the Lancashire industry was to a large extent paralysed, not from any want of raw material, not because it was not certain that large quantities of cotton goods would be required, but because no one could be sure as to the conditions in which trade could be carried on. No one could tell what the real price of raw cotton was, and it seemed at one time as if the trade would be brought to a complete standstill as soon as the stocks of raw cotton actually in the hands of the manufacturers were exhausted. The actual effect upon the industry is pretty clearly indicated by the accompanying tables (Tables XII.—XV.), which may be left to speak for themselves. During the first eight weeks of war the Amalgamated Spinners Associations, with some 70,000 members, were making out-of-work payments at an average rate of £7000 per week. According to an estimate made by the *Manchester Evening News*, early in October the estimated loss of wages in the cotton trade amounted to £200,000 per week.

In the circumstances it is obvious that the United States, which

supplies more than 80 per cent. of the raw cotton required in this country, and Egypt, which supplies the bulk of the remainder, would

XII. Imports of Raw Cotton into United Kingdom.

Quantity in Thousand Centals of 100 lbs.

	July 1914.	Aug. 1914.	Sept. 1914.	Oct. 1913.	Oct. 1914.	Nov. 1913.	Nov. 1914.	Dec. 1914.
Total,	893	665	398	2599	657	3511	1308	2680
From United States,	...	...	100	...	..	...	...	...
From Egypt,	...	...	82	...	...	..	...	...
From India,	...	...	84	...	..	.	..	.

Value in Thousand £.

	July. 1914.	Aug. 1914.	Sept. 1914.	Oct. 1913.	Oct. 1914.	Nov. 1913.	Nov. 1914.	Dec. 1914.
Total,	2907	1689	1121	8594	1540	...	...	6133
From United States,	...	...	...	6347	1069	...	2321	3788
From Egypt,		...	...	1679	177	...	418	2071
From India,	...	...	...	92	36	...	25	169

Average Price per Cental.

	Sept. 1913.	Sept. 1914.	Oct. 1913.	Oct. 1914.	Nov. 1913.	Nov. 1914.	Dec. 1914.
From United States, ...	£2·9	£2·2		£2·2	...	£2·0	£1·9
Egypt, ...	4·4	3·8	...	3·7	...	3·9	3·5
From India, ...	2·4	2·4	...	2·0	.	1·7	1·9

XIII. Exports of Cotton Yarn from United Kingdom.

	July 1914.	Aug. 1914.	Sept. 1913.	Sept. 1914.	Oct. 1913.	Oct. 1914.	Nov. 1914.	Dec. 1914.
Total quantity in million lbs.,	19·9	8·0	15·7	9·7	20·0	8·0	9·5	10·0
Total value in thousand £,	1377	591	1165	535	1402	478	511	520
To Germany,	437	189	429	...	503	...	...	...
To Netherlands,	163	40	108	168	194	98	164	176
To Belgium,	25	7	28	0·7	27	...	...	...
To India,	260	118	186	206	208	169	118	67
Average price per 100 lbs.,	£6·6	...	£7·4	£5·5	...	£6·0	£5·3	£5·2

also be affected to a very large extent, and in all the three countries—our own, the United States, and Egypt—the Government was appealed to to do what they could to meet the situation. In the third week of

August a conference was held at Washington, U.S.A., to consider the practicability of some scheme for maintaining the price of cotton at ten cents (5d.) per pound, which was the alleged cost of production of that raw material. While that was deemed to be impracticable, the members of the conference were assured that commercial paper secured by warehouse receipts for cotton would be on a par with bonds as securities against emergency currency under the Aldrich-Vreeland Act, and we are told that the members of the conference separated with the conviction that

XIV. Exports of Cotton Piece Goods.

	July 1914.	Aug. 1913.	Aug. 1914.	Sept. 1914.	Oct. 1914.	Nov. 1914.	Dec. 1914.
Total quantity in million yards,	629	580	313	374	371	307	276
To India,	283	259	153	266	225	164	118
To China and Hong Kong,	60	62	28	18	20	18	22
To Turkey,	38	...	10	...	0·6	0·2	...
To Egypt,	27	...	10	...	9	5	8
Total value in thousand £,	8659	8171	4497	4931	4938	4189	3909
Average price per 100 yards,	£1·4	£1·4	£1·4	£1·3	£1·3	£1·4	£1·4

XV. Average Number of Hours Lost in Oldham District.

Week ending	Total.	American.	Egyptian.
Aug. 15.	37	...	...
Sept. 12.	21	23	18
,, 19.	17	18	12
,, 26.	21	23	8
Oct. 3.	23	24	16
,, 10.	23	24	15
,, 17.	23	25	14
,, 24.	23	24	15

cotton was then actually worth nine cents per pound in New England, and eight and a half cents in the south, until about the first of December. In spite of that the weekly quotations of the price of raw cotton in local markets went steadily down during September and October, until on the average of the three days from the 22nd to the 26th of October the price of raw cotton was quoted at from six and five-eighths to six and a quarter cents per pound. Since then, however, there has been some recovery in price, and the trade seems to be gradually ascertaining the conditions on which it may resume more or less its ordinary course. It is anticipated, however, that owing to the surplus which is believed to be bound to accrue at the end of the year, a smaller supply of raw cotton will be wanted next year, and that next year accordingly a considerably smaller area will be devoted to this crop in the United States,

more land being, no doubt, devoted to those crops whose price is raised by the war. In Egypt the Government concluded arrangements with the banks to make advances on cotton, either to cotton merchants or directly to cultivators, special contracts being found necessary to assist the needy cultivators: and in order to provide against loss which might be incurred in this way by an excessive supply of cotton during the following season, the cultivation of raw cotton was absolutely prohibited in the basins of Upper Egypt, and was restricted to one-fourth instead of one-third of the area of holdings in the Delta. In Lancashire the price that was demanded for raw cotton in Liverpool remained for a considerable time so much in advance of that in the United States as greatly to hamper the recovery of the industry. Spinners were recommended to buy direct from the planters in the United States, but it is very doubtful if this recommendation could in many cases be carried out with advantage. For so highly organised and specialised a trade industry as that of cotton in Lancashire a great central market for the raw material is absolutely indispensable. At last, however, it was found practicable to reopen the cotton exchanges both in Liverpool and the United States on the 16th of November, and there seems now to be a prospect of gradual recovery. Of course, it is not to be expected that the industry for this year can attain anything like the magnitude of previous years, but once the trade is allowed to take its ordinary course, the lowered price of raw material may, notwithstanding war risks, allow of a steady growth of profitable trade even at reduced prices for the finished article.[1] Other textile trades have not suffered nearly so severely. For one thing, they do not manufacture to nearly the same extent for foreign markets, and in many branches of these industries the trade has been stimulated by the demand arising from the war. The jute industry is perhaps an exception whose depression is severely felt in Dundee.

The exports from this country next in value to cottons are iron and steel wares in the aggregate, but in spite of that the table of imports into this country from Germany shows that the largest percentage in point of value falls under that head. The explanation of that is to be found in the nature of the British iron and steel imports when considered in relation to the special advantages that Germany has for the production of pig-iron and all half-finished goods. Within the frontiers of Germany, or at least of the German Zollverein, are found by far the most extensive deposits of iron ore on the continent of Europe that can be produced at a cheap rate. Formerly those ores were incapable of

[1] The course of the cotton trade subsequent to the delivery of this lecture has confirmed this anticipation. Since about that time the deliveries of raw cotton to the trade week by week, down to the end of January 1915, have compared fairly well on the whole with the deliveries for the corresponding weeks of the previous year. The price of middling American raw cotton reached its lowest average in the week ending December 11, when it was 4·28d. per pound. It has since risen to 5·10d. for the week ending January 22, 1915, and in the following week it was still upwards of 5d. One circumstance that has contributed to the revival of the trade is that Government orders to a considerable amount were given also to this branch of the textile industry.

being used for manufacturing steel wholesale, but ever since the invention of Messrs. Thomas and Gilchrist in this country in 1879 for rendering the similar ores of Cleveland available for such processes by the dephosphorising of the ores in the Bessemer converter, this obstacle has been removed. Germany possesses in the immediate neighbourhood of the Rhine abundance of smelting coal. By means of the Rhine the other varieties of ore required in Germany can be cheaply imported. The rapid growth of Germany, to which we have already adverted, supplies a large internal market for iron and steel wares, and, as we have already seen in considering the export table of Germany, this is greatly increased by the surrounding countries. And in connection with this one may point out that as the growing export of coal by sea has favoured the development of British shipbuilding, which thus provides an important market for the British iron and steel industry, so the rapidly increasing production and export of coal by rail in Germany has furnished no inconsiderable stimulus to the development of the steel industry in that country. Now the principal items under the head of iron and steel that come from Germany into this country are ingots, blooms, billets, slabs, and sheet and tin-plate bars—all articles of the kind that are produced before the iron is cool, most economically produced therefore in the neighbourhood of the blast furnaces, all half-finished materials which are used up without any waste in the finished article, and accordingly transported with the utmost economy, so that this supply is of great importance to the iron and steel industries of this country which produce the finished article. The tin-plate bars, for example, are very largely imported into South Wales from Germany, which, on the other hand, forms no unimportant market for Welsh tin-plates. And of this last commodity, it may be noted, a serious shortage is said to be now experienced in Germany, creating a difficulty in canning the food-stuffs required for the supply of the German troops. In general, however, it may be pointed out that while the more important branches of the iron and steel industry of this country may to some extent suffer for the want of that cheap half-finished raw material from Germany, all the more demand will be created for such goods from British producers.

In the trade of the United Kingdom, however, a more serious situation was created by the stoppage of supplies of sugar from Germany and Austria-Hungary. Though, since the sugar convention of 1903 the proportion of sugar obtained from these two countries has been declining, we still derive thence about 70 per cent. of our total import of refined sugar, and more than 60 per cent. of that of the unrefined. The result was that immediately after the outbreak of the war there was a tendency to a rapid rise in the price of sugar, the effects of which are shown strikingly enough in Table XVI., which at the same time reveals to some extent the result of the measures taken by the Government to meet this situation.

On the 20th of August 1914 a Royal Commission was issued to inquire into the supply of sugar in the United Kingdom, to purchase, sell, and control the delivery of sugar to officials of His Majesty's

Government, and generally to take such steps as may seem desirable for maintaining the supply. Large purchases were speedily made by this Royal Commission, the results of which are shown in the largely increased supplies in October, more particularly from Java. It will be observed,

XVI. Sugar Imports, United Kingdom.

Quantity, Thousand Cwt.

	July	Aug.		Sept.		Oct.		Nov.		Dec.	
	1914.	1913.	1914.	1913.	1914.	1913.	1914.	1913.	1914.	1913.	1914.
Refined, . .	1707	1701	355	1254	274	975	1918	1887	2073	2227	2394
Unrefined, . .	816	1981	360	532	1390	1383	2146	1965	4371	2141	3163
Total, . . .	2523	3682	716	1786	1664	2358	4094	3852	6444	4368	5557
Entered for consumption, .	3602	3125	2338	2676	2085	2480	2746	3032	3354	3188	2241

Value, Thousand £.

	July	Aug.	Sept.	Oct.		Nov.	Dec.
	1914.	1914.	1914.	1913.	1914.	1914.	1914.
Refined, total, ...	1108	360	360	651	2569	2526	2846
From Netherlands, . . .	217	47	40	180	492	81	229
From Germany and Austria-Hungary, ...	866	46	...	382	...	...	...
Unrefined, total, . . .	397	...	1461	695	2349	4481	3098
From Germany and Austria-Hungary, ...	280	...	...	545	...	...	...
From Cuba, ...	40	...	719	0·5	347	54	...
From Java, ...	..	...	203	...	1136	3343	1691
From British West Indies, .	13	...	169	3	151	171	417
Total, refined and unrefined, .	1506	...	1820	1346	4918	7007	5944

Average price.	July 1914.	Oct. 1914.	Nov. 1914.	Dec. 1914.
Refined, . .	£13 per ton.	£26·4 per ton.	£24·4 per ton.	£23·8 per ton.
Unrefined, .	£9·7 ,, ,,	£21·9 ,, ,,	£20·5 ,, ,,	£19·6 ,, ,,

however, that while the supply of this country is secured, it is at a much higher price, but the further results have been in various ways conflicting. Once the Government had made sure of this country obtaining what it required, it prohibited the import of sugar altogether from the 24th October, with the view of preventing any possibility of Germany profiting by any indirect trade in that commodity with this country. At first Germany had prohibited altogether the export of sugar, in order to shorten our supplies, but afterwards it removed that prohibition, largely in order that these official purchases might be made even more unprofitable to this country. The result is that sugar has become very much cheaper in some foreign countries than in our own, which has caused great complaint on the part of British confectioners and other users of raw sugar that their industries are prejudiced by the Government action. They contend that as the purchase policy was

adopted in the interest of the country as a whole, the country should be made to feel the loss that would result from the Government reselling the sugar at a lower price than it had paid. One of the indirect results of this policy may be mentioned—that this purchase from Java would appear to have been made largely at the expense of India, which in recent years had become more and more dependent upon the rapidly growing production in the island. It was computed that while Indian imports of sugar from Java and Mauritius during the last season reached about 750,000 tons, their combined contracts for the present season would not be more than 250,000. Naturally, efforts are being made at the present time by those who have long been interested in trying to promote the cultivation of sugar-beet in this country to take advantage of the present crisis, but what the results of these efforts will be is, of course, uncertain.

I will say just a few words with regard to one other of our chief imports, that of timber. A consideration of the main sources of supply shows how seriously that import is bound to be affected by the war. Our timber supply comes chiefly from the Baltic (Russia and Sweden), though also from Norway, France, North America, and other parts. But the fact of so much coming from the Baltic has enabled Germany to inflict a serious blow upon that branch of our trade by declaring wood contraband. Even our supplies from the Landes in France are diminished, owing to so many of those employed in forests being drafted off to the war. The chief result is a considerable shortage of timber, which, you will remember, is stated as one of the causes which recently led to an advance in the price of coal.

Difficulties have been created in various industries in this country in consequence of our almost complete dependence upon Germany for various chemicals, light upon which is thrown by the next table.

XVII. Chemical Imports, United Kingdom.

Value in Thousand £.

	July 1914.	Aug. 1914.	Sept. 1914.		Oct. 1913.	Oct. 1914.	Nov. 1914.	Dec. 1914.
Total.	1211	698	660		1220	868	856	1104
			1913.	1914.				
Aniline and naphthaline dye stuffs, . . .	137	22	119	10	146	37	67	51
Alizarine and anthracene dye stuffs, . . .	18	3	15	...	46	...	...	0

Average Price Aniline and Naphthaline Dyes per Ton.

July 1914.	Aug. 1914.	Sept. 1913.	Sept. 1914.	Oct. 1913.	Oct. 1914.	Nov. 1914.	Dec. 1914.
£110·2	...	£109·2	£109·6	...	...	£162	£151.

For certain chemical products Germany has an unquestionable geographical advantage, viz. for all the potash compounds. That

country possesses the only deposits of raw potash capable of being worked on a large scale known to exist anywhere in the world. These were first found at Stassfurt in the south of the Prussian province of Saxony, and are now known to be widely scattered over that province as well as some of the adjoining German territories, and in addition to these, an important deposit was discovered in Upper Alsace in 1911. These deposits give to Germany such an important advantage in the manufacture of potash compounds that the old processes of obtaining potash from wood ashes and kelp have been completely superseded, though proposals to reintroduce these have been made since the war. Potash, however, is indispensable only for manures and the manufacture of gunpowder. For all other purposes it can be replaced by sodium compounds, and in the manufacture of such compounds the United Kingdom is at least equally advantageously situated with Germany.

But there is another chemical industry for which Germany has no special geographical advantage, and in which she has got ahead of all the world, that is the manufacture of coal-tar dyes, originally a British invention, and one for the prosecution of which the raw materials are sent in large quantities from this country to Germany. The almost complete monopoly which Germany now enjoys in this manufacture must be ascribed mainly to the success of German enterprise, and the great ability with which an ample supply of highly skilled, including highly educated, labour has been organised for the purpose. One result of cutting off our supplies of the products of that industry is that all our textile industries are at present threatened with a speedy and serious shortage of dye materials, and this fact has caused the Government to intervene to give its support to the most gigantic of the numerous proposals that have been made since this war began for the "capture" of German industries. It is proposed, it is said, to create a company with 4½ millions of capital: 3 millions of that capital to be raised by those who would make use of large supplies of the dyes manufactured: while the remaining 1½ millions would take the form of debentures upon which the Government offers to guarantee the interest.[1] The

[1] Such was the scheme under discussion at the time of the delivery of the lecture, but since then the representatives on the committee for carrying out the scheme of two of the most important dye users, the Bradford Dyers Association and the calico printers, have withdrawn from the scheme, and the hope of finding the necessary capital for the scheme as originally put forth has had to be abandoned. A new scheme has now been substituted, and this, it is stated, has the approval of an enlarged committee of dye users. It provides for an original share capital of £2,000,000 sterling, of which, in the first instance, only £1,000,000 would be issued. The Government is prepared to advance pound for pound of share capital up to a maximum of £1,000,000, and, if it should be subsequently found to be necessary, the Government will contribute a further advance of a maximum of £500,000 at the rate of £1 for every £4 of further share capital subscribed, with the result that, if full advantage were taken of the Government offer, the company would ultimately have a share capital of £3,000,000, together with a capital of £1,500,000 lent by the Government at the rate of 4 per cent., the Government loan to be repayable within twenty-five years, but the payment of interest to be non-cumulative for the first five years. The Government has likewise undertaken to make a grant to the company during a period of ten years of a sum not exceeding £100,000 in the aggregate to be devoted to experimental and laboratory work in connection with the scheme. It is said that this scheme has the prospect of being successfully carried out, but in the meantime (15th February 1915) further details are awaited.

scheme is certainly an interesting one, and I will not venture to make any prophecy as to the likelihood of its success. Those only who are intimately connected with the business can possibly be in a position to form an estimate upon that head. Still, it may not be out of place for me to set forth at least some of the considerations that have to be taken into account in making any such forecast. First, we have to bear in mind that the industry with which this company would have to compete is one that has already been developed to gigantic dimensions, and that is in itself an advantage in favour of any industry. We must remember also that at the conclusion of the war the great majority of those who have built up that industry will still be available to carry it on; and even if Germany were so thoroughly beaten in the course of the war that its economic conditions were greatly depressed, that would only mean that that highly educated labour, which Germany has in ample abundance in this industry, would be available at lower salaries, and in that way the industry would be all the more able to compete with the new rivals and recover its former supremacy. I may recall a fact in the history of the woollen industry of this country in connection with the Franco-German War of 1870-1871. Without any special efforts being made, but merely as a result of that war, which interfered greatly with the woollen manufactures of both countries, more particularly those of France, our principal rival in the woollen industry, inasmuch as the war was waged, like the present war, partly in one of the most important woollen manufacturing districts in that country, viz. that which includes Lille, Roubaix, Tourcoing, and Ste. Croix, the woollen industries of Great Britain were greatly stimulated. The consequences of that stimulus are best seen in the statement of the exports of worsted stuffs, at that time by far the most important of the exports of this country belonging to the woollen industry in the largest sense of the term. There was a sudden rise from 236,000,000 yards exported in 1870 to 307,000,000 in 1871, and 345,000,000 in 1872, but immediately after that there was a decline in quantity which was continuous till 1883, the last year in which this heading can be separately distinguished among the woollen exports of this country, when the total reached only 186,000,000 yards. It is sometimes said that the bitterness of feeling created by the war between these two countries will prevent dealings with Germany after the war. With reference to that contention, I will merely mention another incident connected with the war just referred to. Just before the outbreak of that war the Paris gas-works were supplied with coal from a German colliery, but no sooner was the war over than, notwithstanding the bitterness of feeling that was then created between France and Germany, that trade was resumed. But between Great Britain and Germany the bitterness of feeling resulting from the war is much more likely to prevent the employment of Germans in this country, thus depriving us of foreign aids that we might have had in developing this chemical industry, and increasing for Germany the supply of labour likely to intensify the German competition.

On the other hand, there are perhaps at the present juncture some circumstances favourable to the project. It may be that the means for

organising this industry in Great Britain now exists to a greater extent than is generally alleged. More particularly, according to some accounts, the lack of trained chemists necessary for the development of the industry is, by many who are acquainted with the trade, said to be exaggerated. There does seem to have been a time when this country relied too much upon its natural geographical advantages and neglected the necessary efforts in the way of education and organisation to keep ahead of its competitors. But I am not so certain that this is true to the same extent now, and in expressing this opinion I am greatly influenced by the judgment expressed by foreigners. In an article by Mr. W. Hasbach which appeared in *Schmollers Jahrbuch* in 1903 there is an interesting comparison between the conditions of British and German industry at that time and the period immediately preceding. Mr. Hasbach, it may be mentioned, was well qualified to judge. He had paid two visits to this country at intervals of about twenty years. Twenty years ago, he says, he was so assured of the British superiority in technical equipment and factory organisation that he wished to ascertain its causes. Previous to his second and more recent visit he prepared himself by visits extending over several years in the industrial districts of western Germany, and came to this country in 1898 with excellent introductions. The examination of British conditions at that time satisfied him that then Germany had completely made up her leeway: but, on the other hand, he observes that after a period of comparative sluggishness there prevailed in England a mighty striving after the reconquest of industrial predominance, which, he said, had been already attained. Methods of business had been changed, the knowledge of languages increased, and her system of technical education developed in an admirable manner: and he warns Germany upon that ground that she must be on her guard and prepared to meet British efforts in the markets of the world in good time by improvements at home. If that is so, the favourable opportunity to give the industry a start may be all that is wanted for continuous progress. It is an exceptional thing for a great industrial country to depend so largely on foreign countries for products for which it affords an enormous market as this country does in the case of coal-tar dyes and other chemicals.

But however it may be with the chemical industries, I confess that, for the reasons already indicated, I foresee no easy time for the various attempts which, we are told, are to be made to "capture" German industries. Everything seems to confirm the view I have expressed elsewhere, that it is more or less perilous for a country to have its commercial and industrial prosperity based chiefly on advantages of a temporary nature.

One other remark I will venture to make as fairly, I think, coming within the scope of my subject, and not going beyond the limits set by the rules of this Society. We have had occasion to refer incidentally to several cases which show how widespread has been the shock to industry even in neutral countries as the result of this gigantic struggle, but many more illustrations might have been given. Now it is no new experience that neutral countries may suffer greatly in consequence of a

great war. One has only to think of the terrible distress endured in Lancashire at the time of the Civil War in America from 1861-1865. But never before has so large a part of the world been affected in this way. In proof of that it is perhaps enough to point out that it was deemed necessary, not only by most of the belligerent countries but also by the Argentine, Brazil, Bulgaria, Denmark, Norway, Italy, and Sweden, to proclaim a moratorium immediately after the outbreak of war. Hence there is an almost world-wide feeling that this war is not merely a clashing of the interests of the belligerents, but that it is an injury to the whole world, and of this idea I know of no more significant indication than that which occurs in the reply of President Wilson to an appeal made to him by the German Emperor. In that reply he says: "A day of settlement will come, when I am convinced that the nations of Europe will unite to end their differences. Whoever has been in the wrong will learn the sequel, and the responsibility will fall on the guilty." This is not the place to decide where that guilt lies, but the idea that guilt is somewhere attached to the outbreak of this war is distinctly expressed. If by any possibility any wholesome fruit can grow from the development of this idea, then perhaps we may say that this deplorable war has not been waged altogether in vain.

THE AUSTRALASIAN ANTARCTIC EXPEDITION[1]: A REVIEW.

(*With Illustrations.*)

In two large volumes Sir Douglas Mawson has told the story of the first Australasian Antarctic Expedition. This expedition followed the example of the *Belgica* and the *Scotia* in making scientific exploration its foremost aim, and in having no ambition to reach the Pole. It needs no small amount of courage and perseverance to appeal to the public for funds with a programme of that nature, and Sir Douglas Mawson had some difficulty in raising the necessary funds. But Australia responded more liberally than the home country has ever done for comparable ventures, with the result that in December 1911 the expedition was ready to sail from Hobart.

Mawson was fortunate in his scientific staff, nearly all young graduates of Australian universities, but most of all was he to be congratulated on securing the services of Captain J. K. Davis. As captain of Sir E. H. Shackleton's *Nimrod*, Davis was a man of proved capacity when he undertook the far more difficult task of navigating the *Aurora* to the uncharted shores of Antarctica south of Australia. Much of the success of Mawson's expedition was due to Davis' able handling of the ship and his splendid ice navigation. It was Davis also who was responsible for

[1] *The Home of the Blizzard: Being the Story of the Australasian Antarctic Expedition*, 1911-14. By Sir Douglas Mawson, D.Sc., B.E. Illustrated in colour and black and white, also with maps. 2 vols. London: William Heinemann, 1915. *Price* 36*s. net.* (The blocks of the accompanying illustrations have been kindly lent to us by the publishers. —Ed. *S.G.M.*)

the valuable oceanographical work done between Australia and Antarctica, researches which were carried out in almost completely unknown seas and in most adverse weather conditions. To this era of polar research Captain Davis is what Captain T. Robertson was to the last—a brilliant ice-master with that instinctive understanding of the ways of ice which comes to comparatively few men. It is to be hoped that his skill and knowledge will be utilised on future polar expeditions.

Mawson chose that part of Antarctica loosely termed Wilkes Land, of which nothing was known since the discoveries of Wilkes and of Dumont d'Urville in 1840. D'Urville had landed on Adelie Land, but Wilkes had not set foot on the continent, and his vague accounts had left uncertain the exact position of the continental coasts. The original idea of Mawson was to form three bases at intervals along this coast, but circumstances caused him to change this plan in favour of two bases, 1500 miles apart, with eighteen and eight men at each respectively. The main base, under Mawson's personal command, was at Commonwealth Bay in Adelie Land. The other, under Mr. F. Wild, who had served both in Scott's and Shackleton's expeditions, was on the Shackleton Ice Shelf about 160 miles east of Drygalski's Gaussberg. Neither situation was particularly favourable, but they were the best that could be found on this unapproachable and stormy coast. Wild's party, indeed, wintered not on the land, but on an ice shelf which, for all they knew, might carry them out to sea before the ship returned. However, it was a question of landing there or returning to Australia. For in the end of February the ship could delay no longer in that part of the Antarctic with any chance of escape. About seventeen miles to the south of this station were the rising slopes of the ice-covered land.

At the two bases research in meteorology, magnetism, and biology was carried on, and exploration conducted to east and west by sledge journeys. A party from the main base also reached the south magnetic pole. Between the two bases Captain Davis explored with the ship. The result of all these explorations, extending from 89° E. to 132° E., has been to remove several names from the map and to add others. The *Aurora* sailed south of Balleny's Sabrina Land and saw no trace of it. This land, therefore, as well as all the land reported by Wilkes, except Knox Land, have been erased from the map by Mawson. Knox Land, he admits, may exist, but pack prevented an approach. In this case he argues quite rightly that a sounding of 300 fathoms indicated the probability of land within sixty miles, the distance the *Aurora* was from the position of the land given by Wilkes. On the other hand, the *Aurora* got a sounding of 340 fathoms within seven miles of Totten High Land of Wilkes, but failed to see it in clear weather: Mawson therefore removed the name from the map. Now 340 fathoms surely indicates land not far to the south, and even if Wilkes' landfall is not exactly where he placed it, we question the justice of wiping out his discovery altogether and obliterating his name. Budd's High Land and North Land should still appear on the chart, for the *Aurora* failed to get near them on account of heavy pack. The *Challenger* in 1874 had questioned Termination Land, and the *Aurora* found its site occupied by Termination

Ice Tongue. The use of Wilkes' name in this case perpetuates his work. Had his latitudes been right Wilkes could not have seen Queen Mary Land 150 miles south of this. But we cannot help feeling that some allowance must be made for small inaccuracies of latitude and longitude, and the spirit of the explorer's work recognised even if the letter is wrong. Mistakes in position are easy to make in polar regions, and were none the less liable to occur nearly a century ago. In this respect Ross suffered from injustice in the case of his Parry Mountains and his

Walking against a strong wind.

discovery of what was later called Edward Land. Mawson has given Wilkes' name to a strip of coast land immediately west of Adelie Land, which at least commemorates that American explorer, but it seems a little unfair to wipe out all Wilkes' names. Some of his landfalls have certainly not been disproved in the positions he gave.

George Land (a brief and more convenient version of George V. Land) will certainly link up with Oates Land on the east, while Wild's discoveries linked Queen Mary Land to Wilhelm Land. The abundance of "Lands" along this coast will prove tedious if the outline is charted and named piecemeal. The old use of Wilkes Land for all this coast-line was convenient, though perhaps not strictly accurate, and it is doubtful whether in practice the name will be employed in the restricted sense in which Mawson uses it. The "High Land" sighted from the *Gauss* in 1902 was found to be an island, and was suitably named after Drygalski.

This coast is much encumbered with pack ice, which is rather curious in view of the persistent south-easterly winds. In places these cause habitually ice-free seas: D'Urville Sea off Adelie Land, and Davis Sea off Queen Mary Land. But these are each in the lee of more or less permanent obstacles of ice—in the latter case the Shackleton Ice Shelf, and in the former a "barrier" of pack ice off George Land, which may be held by islets or by bergs grounded in shoal water. The cause of the blockage in this case is not clear. We would have liked to have read Captain Davis' opinion regarding the feasibility of exploring these coasts from a ship rather than by land journeys, and whether he considers there may be a strip of open coastal water behind the pack further to the west towards Enderby Land.

We notice that Dr. W. S. Bruce's name has been attached to a small but marked rise in the floor of the ocean off Termination Ice Tongue "in recognition of the oceanographical work of the Scottish Expedition in Antarctic Seas." We are glad to see this, but would have welcomed Dr. Bruce's name attached to some more conspicuous feature. The Australasian Expedition owed so much to him in the loan of oceanographical equipment and advice as to its use that it is no exaggeration to say that without his help there would have been few results in oceanography.

This was the first Antarctic expedition to employ wireless telegraphy. The base was linked up with Australia *via* the expedition's subsidiary station at Macquarie Island. The high winds of Adelie Land destroyed the masts several times, but otherwise the installation was successful and many messages passed. In summer the continuous daylight lessened the range and cut off communication.

The volumes abound with adventure in every chapter. The wintering of the western party on the Shackleton Ice Shelf was in itself a daring undertaking: fortunately the party met with no accident. But Sir Douglas Mawson had the misfortune to lose his two companions, Lieutenant B. E. S. Ninnis, Royal Fusiliers, and Dr. X. Mertz, one after the other, on his great eastern sledge journey. Lieutenant Ninnis fell down a crevasse with one sledge and a dog team. Mawson and Mertz, finding themselves with one and a half week's provisions and six dogs, were compelled to turn back, 315 miles from the base. By eating the dogs and going on reduced rations they managed to get along. Three and a half weeks later Mertz succumbed. Mawson was left alone with 100 miles to traverse and barely any food. The record of that lonely march is stirring reading and eloquent of the perseverance and endurance of the man: there was little hope, only the will to live kept him going. Once he fell into a deep crevasse and hung on the end of the sledge rope fourteen feet below the surface. By a great effort he reached a knot on the rope, and laboriously climbed up. As he reached the top a further section of the snow edge gave way, and once more he was hanging at the end of the rope. "Below was a black chasm: it would be but the work of a moment to slip from the harness, then all the pain and toil would be over. It was a rare situation, a rare temptation—a chance to quit small things for great—to pass from the petty exploration

of a planet to vaster worlds beyond. But there was all eternity for the last, and, at its longest, the present would be but short." Slowly he gained the surface, and was safe—from that danger; but starvation was drawing near. There were other narrow escapes, but he plodded on. Luckily, the weather was not as bad as usual, or Mawson's story would never have been written. At length, by a stroke of rare good fortune, he came across a food depot which the search party had left only six hours before. He was saved. But bad weather delayed him, and he reached the hut in time to see the *Aurora* leaving for the west to fetch Wild and his party. She had waited nearly four anxious

The head of a bull sea-elephant photographed in the act of roaring.

weeks, and could delay no longer if she was to make certain of relieving Wild. Mawson recalled the *Aurora* by wireless, but the weather prevented Captain Davis' return. Should he wait for an improvement in the weather—it might be many days—or should he steam westward to relieve Wild's party? Davis had, in fact, to decide which party was to be abandoned, Mawson's or Wild's. Wireless communication failed. On him alone fell the burden of this decision. It was not an enviable position. Davis has said it was the worst hour in his life, but he made up his mind, and steamed westward to Wild. Mawson's party, at least, was safe and well-provisioned. Wild's party might be in grave peril—even then it was late enough for a ship to reach their station. "Determination, fearless and swift, was necessary; and, in coming to his momentous decision, Captain Davis acted well and for the best

Where the plateau descends to Commonwealth Bay.

interests of the expedition." Wild's party was found and brought back to Australia. In the summer of 1913 Captain Davis was in London working hard to secure more funds for the expedition. Once more he returned to the Antarctic, and in February 1914 the whole expedition was back in Australia with a fine record of successful work behind it.

It is too early yet to estimate all the results of Mawson's expedition, but we may expect them to be of the first importance, since his field of work was previously untouched, and his object throughout was research. At any rate, we know that the lands explored are a continuation of the plateau of Victoria Land. The geological details will be awaited with interest. Most striking, perhaps, are the meteorological results, especially as regards winds.

The persistent strong winds in Adelie Land give it claim to be considered the windiest place on earth—at least at sea-level. "We have found an accursed country," writes Mawson, nor could any one regard it otherwise when the average wind velocity for the year was 50 miles an hour. The average for July 1913 was 63·6, and for eight consecutive hours one day in that month it blew at an average of 107 miles an hour. These terrible winds were accompanied by drift. "Picture drift so dense that daylight comes through dully, though, maybe, the sun shines in a cloudless sky; the drift is hurled, screaming through space at 100 miles an hour and the temperature is below 0° F. You have then the bare, rough facts concerning the worst blizzards of Adelie Land. The actual experience of them is another thing."

The many biological discoveries include a large rookery of Emperor penguins at Haswell Island, Queen Mary Land, and the first discovery of the eggs of the Antarctic petrel.

Several delightful chapters are devoted to the life and work of the subsidiary post on Macquarie Island.

The book is a fascinating one, well worthy to stand among the classics of Antarctic exploration, but in no ungenerous spirit we would suggest that curtailment would not have lessened its interest. A general account of the Antarctic regions in the first chapter, though brief, will be useful to the reader, and is an excellent innovation in this type of book. The three maps (in a pocket) are clear and good, while the larger illustrations are beyond all praise. A number of colour photographs are included. Some are distinctly good, but others fail to express the true shades.

R. N. Rudmose Brown.

LAND FORMS AND LANDSCAPES.[1]

By J. D. Falconer, M.A., D.Sc., Lecturer in Geography in the University of Glasgow.

(*With Illustrations.*)

II. The Forms of Endogenetic Relief.

Notwithstanding the progress which has been made of recent years in the investigation of the mechanics of crustal movements, there has been little real advance since the days of Lyell towards the discovery of the ultimate origin of these movements. Many interesting suggestions have been made and various hypotheses have been put forward, but the foundation of fact upon which they are based is altogether too scanty to inspire confidence in their ability to stand the test of time. There can be little doubt that the Lyellian attitude towards this question is still the most philosophic to adopt, and that for all practical purposes the origin of the major features of the earth's surface may still be assigned, as Lyell assigned it, to the action of great subterranean dynamic forces which manifest themselves radially in the elevation and depression, and tangentially in the compression and tension of crustal blocks, their activity resulting from time to time in intense folding, faulting, and thrusting of the lithosphere along definite lines of weakness.

The adoption of this essentially philosophic attitude affords some guidance in the further question of the permanence or otherwise of the ocean basins. Lyell's position has been generally discredited by the supporters of the contraction theory, who hold that the oceanic segments, being the heavier portions of the earth's crust, have been throughout time undergoing the greater relative downward movement, and have always been the relatively depressed areas of the earth's crust. If, however, it be recollected that the contraction theory at best is only an hypothesis, and that the difference between the average elevation of the continental segments and the average depth of the ocean basins is only some fifteen thousand feet on a radius of four thousand miles, it will be at once apparent that there can be no theoretical objection to the Lyellian doctrine of the interchange of ocean floor and continental surface, the required radial movement being relatively very small.[2]

Again, with regard to the vexed question of uniformity or periodicity in crustal movements, there is much to be said for the Lyellian position, which admits a regional intensification of crustal movement as part of the uniform course of nature. The modern periodists, however, claim that, although theoretically the uniformitarian view is the more probable,[3] the geological evidence affords sufficient ground for the belief that

[1] Continued from p. 71.

[2] See also Gregory's *Making of the Earth*, p. 112.

[3] Chamberlain and Salisbury's *Geology*, vol. ii. p. 128.

periods of general crustal disturbance and periods of relative crustal repose have alternated from the beginning of geological time. In the conception of great periodic movements of the earth lies, it has been said, the very "soul of geologic history."[1] But while this is a bold and attractive idea, and one which has inspired many workers in different parts of the globe, it cannot be said that their results in every way confirm the truth of the hypothesis. There is a distinct danger of hasty generalisation. Only small parts of the continental surfaces have yet been minutely examined, and there are few, if any, of the recognised facts which cannot be fitted into the Lyellian doctrine of the uniform course of nature. The great master of physical geography had indeed a philosophic grasp of the world-problems involved which has been unsurpassed by any of his successors!

We may now assume it to be true that the face of the earth was originally fitted out with a certain primary relief, and that this relief has been from time to time locally restored and rejuvenated in order to counteract the activity of the superficial forces of denudation which tend to lessen and remove all irregularities of relief. In this way we advance to the idea of Primary features or forms of the earth's surface, whose origin may be ascribed directly to the activity of the subterranean forces, as opposed to Secondary features or forms which have originated on the surface as the result of the activity of the superficial forces. As, however, the terms Primary and Secondary have already a definite historical significance in geological literature, it is better to substitute the terms Endogenetic and Exogenetic for the two main groups of features into whose intimate character we have now to make more minute inquiry.

It is customary to subdivide the Forms of Endogenetic Relief into (1) Tectonic Forms, or those which may be ascribed directly, so far as we know, to the radial or tangential activity of the subterranean forces, and (2) Volcanic Forms, which may be ascribed to local igneous activity as a proximate cause, although their ultimate origin is probably to be assigned to the action of the same unknown subterranean forces.

In the study of Tectonic Forms it should first of all be noted that when we use the terms fold or block mountain, plateau or plain, basin or trough, the concept which is called up in our minds is of the nature of a landscape, *i.e.* a combination of forms, rather than a single form, and that these combinations have been given their general names mainly from considerations of mutual elevation. When we think of fold or block mountains, we call to mind some mountain landscape in the Eurasian or American line, or amidst the upland blocks and basins of Central Europe or Eastern Asia. When we think of plateaus or plains, we call to mind some landscape in Africa or Brazil, in the steppes of Russia, or the prairies of America. A moment's reflection, however, will show that it would be incorrect to term these concepts of ours Tectonic Forms. Fold and block mountains tend to lose all trace of their original forms, and to assume that variety of secondary erosion

[1] Chamberlain and Salisbury's *Geology*, vol. i. p. 515.

forms of which our concepts are composed, while the surfaces of plateaus and plains have been mainly formed either by superficial erosion or by accumulation. It is evident, therefore, that very careful inquiry must be made into the real nature of the original forms and the degree to which these original forms have been retained to the present day. Only then shall we be able to recognise with certainty those slopes, scarps, and plains to which, from the point of view of the superficial form, an endogenetic and tectonic origin may reasonably be assigned.

(a) *Fold Mountains.*—It may perhaps be allowed that in the case of mountains which were comparatively gently and symmetrically folded, the broad undulations may have had their counterparts at the surface in arch-like ridges and longitudinal hollows, but the superficial agents of

FIG. 6.—Snow-clad dip-slopes of the Hex River (Jura-form) Mountains, Cape Colony.

denudation would at once begin to dissect the ridges and deepen or fill up the hollows. The youngest and most perfect example of this type is the Jura Mountains, in which many of the slopes show, if not the original surface of flexure, then a surface closely parallel with it (Fig. 6). Such slopes are, of course, of polydynamic origin, since the formation of the present surface is the result of the action of superficial agents, but wherever a slope may be reasonably considered to be parallel with any part of an original surface feature, it may be claimed as an Endogenetic Form. This may be termed the Law of Slopes, and any such surfaces in symmetrically folded ranges may be considered as examples of Tectonic Flexure Forms.

But in the case of mountains which have been formed by buckling and folding of the rocks in a very complex manner, it is difficult, if not impossible, to distinguish traces of the original form or even surfaces of rock parallel with portions of the original surface. Experiment shows

that rocks may be highly crumpled below the surface and yet the surface itself may be merely arched or warped in a manner in no way comparable to the folding and buckling of the rocks below. We are also quite ignorant of the surface forms assumed by crustal blocks as the result of great overfolding and thrusting movements. It is sometimes held that the succession of ridges and troughs which may be seen in young mountain chains is an indication of original structure, the ridges being the remains of the original upfolds and the valleys of the downfolds. It is becoming more and more certain, however, with the progress of investigation into mountain architecture that this is rarely the case, and that the ridges and troughs, when closely packed, are mainly exogenetic or erosion forms, and in no sense represent the original endogenetic features. Dip slopes are also commonly found in the Alps and Himalayas, which, on the analogy of Jura-form mountains, might be taken to be parallel with original surface forms ; but, in the majority of cases, these will be found to be simply details of erosion and not original tectonic forms. So intense has been the erosion that even the dip slopes of the Säntis Mountains,[1] of the same age as the Jura, cannot with certainty be described as Endogenetic Forms.

Where highly folded mountain chains occur in widely separated parallel series, it would seem that great tectonic hollows may form between and become in time lake or waste-filled basins, as in the case of the Swiss Foreland, the Vale of Kashmir, or the plateaus of Tibet. In such cases, however, it would be very difficult to find any portion of the present surface which either formed a feature originally or is parallel with an original feature. We may conclude, therefore, that though in ultimate origin fold mountains are the result of the activity of subcrustal forces, there are very few features of the present surface which can be claimed as Endogenetic Forms.

Earthquakes and other crustal movements still in progress may, however, modify from time to time the existing exogenetic forms. Earthquakes may dislodge large masses of rock from the mountain-sides, and thus cause obstructions in the valleys below. A barrier formed in this way may extend right across the valley and cause a temporary valley lake by ponding back the waters. The slopes of the obstruction, but not the floor of the lake, may then be termed tectonic forms. More permanent lakes may arise, however, as the result of crustal movements warping the valley floors,[2] but such cases require very careful investigation.

(b) *Plateaus and Block Mountains.*—A plateau should possess an approximately level surface, and be bounded on at least one side by a fault scarp which interposes a difference of level between the plateau surface and the plains below. There may be a series of plateaus one above the other, or the margin of an extensive plateau may be stepped or terraced by a series of parallel faults. Movement may have been upward or downward or both. No new feature, however, is developed

[1] See Geikie's *Mountains*, Pl. XL.

[2] See for example *Mem. G.S.I.*, vol. xxxvi., Pt. 2, p. 13, Pl. 7.

by tectonic movement on the actual surface of the plateau so long as the surface remains parallel with its original position. The only new feature in such a case is the fault scarp. It is common, however, to find the surface of an extensive plateau thrown into undulations or warped in such a way as to have formed on its surface low domes and shallow basin-shaped depressions. The undulations may take the form of an obvious flexuring of the surface, accompanied locally by the formation of depression lakes, as on the plateau of the Salt Range of India [1] (Fig. 7). Such slopes may justly be termed Tectonic Flexure Forms. On the other hand, the undulations may take the form of a gentle rise and fall of the surface over wide areas which becomes apparent only after a study of the drainage system; or a large portion of the surface of a plateau may

Fig. 7.—A simple flexure on the plateau of the Salt Range of India.

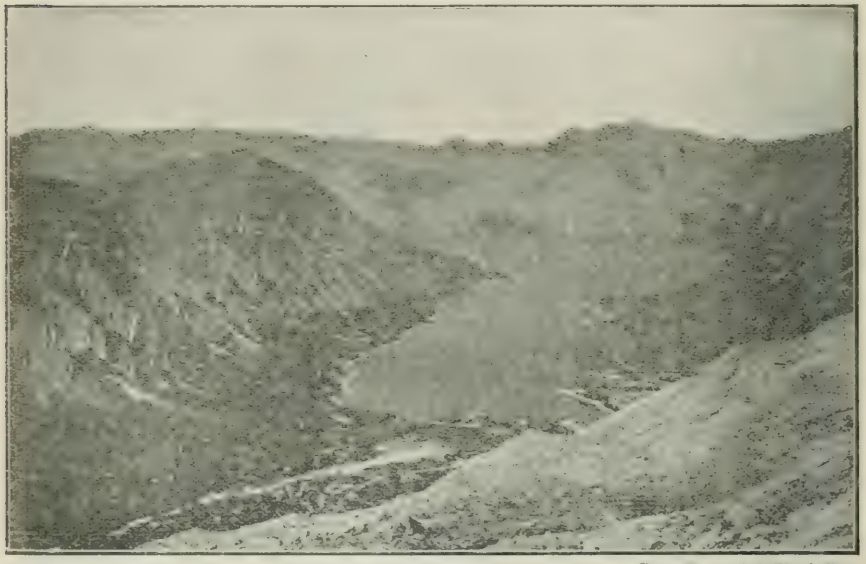
sag in such a way as to form a shallow basin, the centre of which may be occupied by a permanent lake, as in the case of Lake Chad. Such cases, involving wide areas, are more readily grouped as Landscapes than as Land Forms.

The fault scarps of a plateau are to be regarded as typical Tectonic Fracture Forms, as in the case of the stepped plateaus of Arizona. Sometimes portions of the original scarp are to be observed, little altered by weathering. As a rule, however, the fault scarps have been more or less dissected by erosion and frequently worn back parallel with themselves for considerable distances. The same rule may, however, be applied to Fracture as to Flexure Forms, that such forms should be

[1] *Records, G.S.I.*, vol. xl., 1910, p. 36.

termed Endogenetic only when they show either portions of the original fractured surface or surfaces parallel with the original surfaces of fracture which themselves formed features on the surface. Needless to say, fault-line scarps, arising as the result of the erosion of rocks of unequal hardness, are not Endogenetic Forms, such scarps not being parallel with original features although they may occupy the same sites at lower levels.

Again, portions of a plateau surface may be let down between parallel faults to give origin to trough-like depressions, the floors of which may be warped in places to give rise to depression lakes, as in the case of the great East African trough. Such a region would then show both



From Gregory's "Fiords."

FIG. 8.—Tectonic Forms of Cattaro Bay.

Tectonic Fracture and Tectonic Flexure Forms. Similarly in the case of block mountains and basins, the surfaces of the blocks may remain parallel with their original position while those of the basins may be warped to enclose lakes. If the requisite movements occur on the margins of continents, the sea may gain access to the basins and flood them, as in the case of Cattaro Bay (Fig. 8). The blocks may also be tilted, as in the Great Basin Ranges, so that the dip slopes as well as the fault scarps are Tectonic Forms. As before, wherever the present surface may be shown to be parallel with an original surface, formed by crustal movement, it may be termed an Endogenetic feature.

Fold mountains and plateaus may be broken by fracture lines, along many of which vertical faulting movements may take place, while others may have formed simply gaping rifts. In highly folded mountains erosion hollows frequently follow fracture lines, but it is difficult to say

whether in any of these cases there ever was an actual gaping rift at the surface. The gorge of Dariel in the Caucasus and the *cluses* of the Jura have, however, been claimed to be of this nature, and if this were proved, portions of their walls might be taken to be modified Tectonic Fracture Forms. Many plateaus, as for example that of Scotland, were at one time broken by a series of parallel fracture lines which were in many cases filled with igneous material from below. Where the dyke rock has been removed by erosion, the walls of the resulting rift may be doubtfully claimed as Tectonic Fracture Forms (Fig. 9). Where such lines, however, were not infilled, it is possible that in some cases they may have remained more or less open rifts, which ultimately gave origin

FIG. 9.—A rift-line cleared by erosion. Mull of Oa, Islay.

to lines of permanent drainage. It has been pointed out that in Scotland many of the valley lakes lie along fracture lines, and that many of these lakes present the peculiarity of an elongated over-deepened trough in the centre, the deepest part of which frequently falls below sea-level.[1] In the same way, the margins of plateau blocks are frequently crossed by intersecting fracture lines which determine the peculiar drainage system of fiord coasts. Very careful investigation into individual cases would however be required before any portions of the walls of these valleys, troughs, or fiords could be claimed as Endogenetic Forms, even in the modified sense suggested above.

[1] Gregory's *Fiords*, p. 169.

(c) *Plains.*—The surfaces of plains are not usually of tectonic origin, but they may be warped into long and gentle slopes or thrown into repeated undulations, while shallow depressions may also form as the result of the sagging of large areas. All these forms may be claimed as Tectonic Flexure Forms, but the scale is generally so large that they are more conveniently grouped as Landscapes.

(d) *Earthquake Forms.*—The majority of earth tremors are believed to be caused by the adjustment of crustal blocks, large and small, in obedience to unknown laws. This adjustment frequently gives rise to permanent deformation of the surface, and thus to the establishment of new features, obviously of endogenetic character. Many of the tectonic forms already discussed are in this way reproduced in miniature in different parts of the world to the accompaniment of earthquake shocks. It is customary to speak of these minor forms as the result of earthquake action, but it would be truer to say that they are, like the earthquakes themselves, simply the superficial expression of the activity of subterranean forces of conjectural origin.

The deformation forms which are found in regions which have been exposed to earth tremors include warped surfaces, due to local and unequal radial movements of elevation and depression. Movements of elevation are usually difficult to distinguish, except along the coast-line where the beach may be locally elevated for a few feet and cause an apparent retrogression of the sea, as in the case of the Alaskan earthquake of 1899. Movements of depression, on the other hand, may result in the formation of closed hollows in which water may accumulate to form lakes where formerly there had been cultivated ground or forest, as in the case of the earthquake lakes of the Mississippi valley. Earthquake action, however, is frequently accompanied by tensional strain, which causes the fission of the surface. Gaping rifts may form whose walls may persist for a time as definite features, but which usually close after the passage of the shock and the settlement of the crust. Vertical movement may take place along the line of fissure, one side or the other being depressed or elevated with the formation of a fault scarp. Sometimes the downthrow side is warped to form small closed hollows along the line of movement, while the upthrow side is subjected to tension and frequently minutely cracked and fissured in directions both parallel and at right angles to the main line of fracture. Unequal movements along parallel fracture lines may give rise to trough valleys, blocks, and basins, etc., on a small scale. While earthquake forms thus reproduce in miniature the larger tectonic forms already discussed, they afford at the same time a transition to volcanic forms, since earth tremors frequently accompany volcanic activity.

In the study of Volcanic Forms it should be remembered that, from the purely morphological point of view, it is unnecessary to discuss the internal structure and composition of the various forms. It is convenient, however, to distinguish two groups: (1) Intrusive Forms, or those surface forms which are due to the intrusion or injection of igneous material into the crust, but at some distance below the surface, and (2) Effusive Forms, or those surface forms which are due to the piling

up or accumulation of material on the surface by the volcanic forces, these forces having succeeded in piercing the crust.

In the case of Intrusive Forms, it should be noted that, on the hypothesis of magmatic stopping, it is unnecessary to postulate the formation of any surface feature as the result of sub-surface intrusion. There are, however, certain cases in which we may feel certain that the injection of a bysmalith, a laccolith, or a sill of igneous material beneath the surface did give rise to the formation of a more or less extensive and pronounced dome-shaped elevation of the superficial rocks. Such domes, however, are nowhere found in a perfect condition; in fact, they can only be recognised after intense erosion. All that one can hope to find, therefore, is either some small portion of the original surface which has escaped erosion, or, much more probably, some slope of limited extent which is parallel with some portion of the original surface of the dome. This latter condition appears to be fulfilled here and there amongst the slopes of the Black Hills of Dakota. True intrusive forms, however, are very rarely found. Those forms which are often claimed as intrusive, such as the erosion scarps of sills, volcanic necks, lava plugs, dykes, etc., have appeared at the surface only as the result of differential erosion, and are therefore more properly exogenetic forms. The proximate, rather than the ultimate, cause is thus emphasised, as in the case of fold mountains.

Of Effusive Forms we may distinguish as types the volcanic cone, the volcanic dome, the volcanic slope, the volcanic scarp, and the volcanic plain. The volcanic cone or dome is rarely found in a perfect condition, showing everywhere the original endogenetic surface. Usually the cone is more or less furrowed by erosion. By applying the Law of Slopes, however, it will not be difficult to find even in an extinct volcanic cone some portion of the surface which may be claimed as a true endogenetic form. The crater walls, the margins of lava streams, and the sides of volcanic rifts are typical volcanic scarps, while the surface of the crater floor, of a lava stream, or of a lava plateau, though more or less irregular in character, will generally present forms which may be claimed as true volcanic plains. Mud cones and sinter cones, as well as sinter terraces and basins, which commonly appear during the declining phase of volcanic activity, may also be included amongst effusive forms.

It may be presumed that the flowing out upon the surface of great quantities of lava will leave a cavity beneath. The crust will therefore tend to sink down irregularly, and thus present either a warped surface, as in the case of the geyser basins of the Yellowstone region,[1] or a surface marked with miniature blocks and basins, as in places on the floor of the great African trough.[2] Such flexure and fracture forms, whose proximate cause is the activity of volcanic forces, afford a natural transition to tectonic forms.

(*To be continued.*)

[1] *G. J.*, vol. xlii. p. 333.

[2] *G. J.*, vol. xliv. p. 33.

FRONTIER HISTORY[1]: THE LIMITATIONS OF THE POLITICAL OFFICER

We soldiers live out our service lives of thirty years, more or less, in India, and come away with a very partial knowledge of the earlier history of the great Dependency in which the prime of our manhood has been spent. To take my own case, I travelled much between the north-western frontier of India and Europe; I visited also the extreme eastern frontier; I travelled India from Simla to Madras and from Peshawar to Calcutta, but I never even knew that Assam had a history. The names Kochh, Kachāri, Ahom, are to us mere meaningless sounds until we consult Colonel Shakespear's volume, and find that they represent dynasties and peoples powerful in the great valley of the Brahmaputra from the early centuries of the Mohammedan era down to the advent of the British Rāj. To enter into any consideration or discussion of such recondite dynasties must really be left to those who propose to make a more or less detailed study of the country and peoples of this, at present, remote region. I say "at present," because I think it possible that in the future a great trans-continental railway may run up this valley past Sadiya to Rima, and so across China to the Pacific coast. When that time comes the Mishmi, Abor, and Naga, hitherto savage and treacherous, will settle down into peace-loving people of business, and will prey, not upon the lives of their visitors, but upon their purses. The idols of Maibong, the carved stones of Dimapur, the Stonehenge of Togwema, and the monoliths of Marāni will assuredly attract those to whom archæology is a study and an attraction. From what we know of the experiences of travellers in these regions, to wit, Colonel Woodthorpe, R.E., and Captain Pottinger, R.A., the general conclusion is that all such travellers have approached and have traversed the abodes of these tribes only at grave risk to themselves, as might be expected when Colonel Shakespear tells us further on of the wily methods by which these tribesmen have on several occasions surprised and murdered our frontier officers. Two Europeans only, says Colonel Shakespear, have succeeded in getting through from China into Assam via Rima and Sadiya, viz., Prince Henri d'Orléans in 1895 coming from Tonkin across South-West China, and Captain F. M. Bailey in 1911 coming from Batang. An account of this last journey appeared in the *Scottish Geographical Magazine*, and later the results of Captain Bailey's final exploration of the course of the Tsang-po appeared there.

Chapter xv. of Colonel Shakespear's book, bearing the somewhat suggestive title of "Regrettable Incidents, Treachery, Methods of Fighting, etc.," is the one to which it is really the duty of a reviewer, especially if he be himself a frontier officer, to draw attention. When we read there how, time after time, despite previous warnings, British officers and their camps and escorts fell victims to the cool effrontery and daring treachery

[1] *History of Upper Assam, Upper Burmah, and North-Eastern Frontier.* By Colonel L. W. Shakespear. London: Macmillan and Co., 1914. *Price* 10*s. net.*

of these savages, we are simply left in amazement at the seeming foolhardiness of our fellow-countrymen. It happened that one of the earlier victims, Lieutenant Holcombe, had been a schoolfellow of mine at Shrewsbury. The news of his murder at Ninu, east of Sibsagar, in 1874, made a deep impression upon me. When I arrived in India in 1879, General Nation was then engaged with a strong force in storming Khonoma, and taking a final but tardy revenge for the bold act which, five years before, had cost Lieutenant Holcombe and eighty men their lives, and for the subsequent defeats inflicted on parties under Captain Butler and Mr. Damant. After this and other incidents, it is astounding to read in Colonel Shakespear's book the extraordinary narrative of one of the closing scenes of the Abor Expedition, 1911-12. To be brief: the party consisted of a civil (doubtless political) officer, six British officers, and one hundred rifles. The headman of Shimong, which is situate about sixty miles north of Sadiya, in the Dihang Valley, refused to come in or let them pass. Despite this ominous unfriendliness, the next morning the civil officer with all the British officers and *only ten* rifles, started ahead. The Gám, or headman, and three hundred or four hundred armed Abors awaited them in the village. The advanced British party were surrounded and seized, and their death seemed imminent, when a native officer with twenty-five rifles appeared in sight. This saved the situation. The Abors let go their prisoners, and pretended to have been only joking. The British party returned to its camp, and next day well closed up, and with bayonets fixed, passed once more, and this time unopposed, through Shimong village. This is but a summary. The story should be read in Colonel Shakespear's words. When Mr. Bentinck lectured on the Abor Expedition, 1911-12, before the Royal Geographical Society, the President of that Society, an ex-Viceroy of India, went so far as to say that, whenever one of these frontier expeditions was a success, it was due to the ability of the political officer. It is fairly clear that Colonel Shakespear does not share this belief in the infallibility of the political officer, and in subsequently writing on this point in the *Central Asian Society's Proceedings*, I quoted a passage from Sir H. M. Durand's *Life* of Sir Alfred Lyall (p. 226) to show that Durand took a much fairer and more liberal view of the relationship between soldier and political. Colonel Shakespear does not name his "Civil Officer," but he states that "not long after a post of fifty rifles was established at Shimong from Kebang, as one of the supply depôts to *Bentinck's* party exploring up the Dihang." This question of the relations between the senior military and the political officer of a force operating among frontier tribes is of such vital importance that I can only express my amazement at an ex-Viceroy who indulges in a useless revival of a discredited pretension. After the awful fiasco at Kabul in 1841-2 under the politicals, Burnes and Macnaghten, General Sir George Pollock was sent to Kabul by the Government of India with full military *and political* powers. The Duke of Wellington wrote very strongly at the time to Lord Ellenborough, and told him plainly that military success was incompatible with political interference. None the less, when Gough took the field against the Sikhs in 1848, one historian of that war

(Thackwell, A.D.C to Sir Joseph Thackwell), writes thus:—"This narrative must not be concluded without a solemn protest against the system of hampering the commander-in-chief with political agents. Major Mackeson controlled the movements of the chief." When we consider that no soldier, being a field officer, would have presumed to offer his advice to Lord Gough, it is amazing to find a political major recommending the chief to attack the enemy at once. Major Mackeson clearly exceeded the bounds of his duty.

Colonel Shakespear gives an interesting "Bibliography" of North-Eastern Frontier literature. Those who have access to official publications may also consult Captain Mitchell's Report on the North-Eastern Frontier of India (Calcutta, 1883). It is a pleasure to read a nicely printed, nicely bound, well-illustrated, and generally well-got-up book like that of Colonel Shakespear. The Index and Maps are useful.

A. C. YATE.

CORRESPONDENCE: THE RAINFALL REGIME OF AUSTRALIA.

MR. B. C. Wallis sends us the following in regard to Mr. Hunt's communication in our last issue (p. 94):—

"In reply to Mr. H. W. Hunt's comments it will be well to remark that I had not heard of the publication *Climate and Weather of Australia* to which he refers, until his notes informed me of its existence.

"Mr. Hunt's comments upon two quotations from my paper may be dismissed, since they are quoted apart from the qualifications to which they are subjected in the passages wherein they occur. On the general question of the utility of equipluves, which is a matter of some importance, the reader and Mr. Hunt may be referred to the paper 'The Rainfall of the Southern Pennines' (*Quarterly Journal of the Royal Meteorological Society*, No. 172, October 1914), and to the tenor of the subsequent discussion. It does not appear to me that the Figs. 39-50 in *Climate and Weather of Australia* (to which reference is made) show by means of their isohyets the relative importance, for example, of the January rainfall at Wyndham in comparison with the rainfall at that place during the other months; and there can be no doubt that equipluves indicate quite clearly that the rainfall of the uplands of the British Isles is relatively most intense in winter and least intense in summer, and is the precise opposite of the conditions which prevail upon the lowlands—an important fact which is not self-evident on the monthly isohyetal maps of the British Isles. Finally, for international comparisons, crude isohyets are of little value, and only pluviometric coefficients can serve as an adequate base on which to found conclusions; hence the Australian maps were published in continuation of the series begun with the maps of Africa published in the *S.G.M.* in July. Mr. Hunt has been misled upon one point, equipluves are not 'based on a purely imaginary factor—one-twelfth of the average annual rainfall,' but are based upon an average day's rainfall, which is no more imaginary than an average month's rain or an average year's rain, but belongs to the same type of unit."

PROCEEDINGS OF THE ROYAL SCOTTISH GEOGRAPHICAL SOCIETY.

Lectures in March.

On the 8th of March in Aberdeen Mr. I. N. Dracopoli, F.R.G.S., will read a paper entitled "Through Jubaland to the Lorian Swamp." Mr. Dracopoli will repeat his address before the Dundee centre on the 9th, the Edinburgh centre on the 10th, and the Glasgow centre on the 11th. Professor Hudson Beare will deliver the concluding lecture for this session when he addresses the Aberdeen centre on the 22nd of March, and the Dundee, Edinburgh and Glasgow centres on the 23rd, 24th and 25th respectively. The subject of his lecture will be "Australia Revisited."

GEOGRAPHICAL NOTES.

America.

The Colorado Geographic Board.—We have received an official intimation of the foundation at Denver in October last of the Colorado Geographic Society, which in its turn nominated a smaller body, the Colorado Geographic Board, "the actual working arm of the Society," with the object "of supervising and clarifying the geographical names of Colorado, of collecting and preserving the historical associations of towns, streams, mountains, highways, passes, and other geographical features of the State, and of eliminating duplicate or otherwise undesirable names." The communication goes on to say :—

"The Colorado Geographic Board hopes to attempt in every way to secure a nomenclature that will be appropriate and that will reflect the romance and adventure of historical and pioneer days in Colorado. No general revision of names is contemplated at present, however. In addition to the work of collecting and systematising all available historical data for future use, the board is planning to work upon such problems as are presented to them. For example, the United States Geological Survey has in process of publication three or four maps, including the Long's Peak region and parts of the San Luis Valley, upon which specific problems in the way of choosing between contradictory names or giving appropriate names to hitherto unnamed points have arisen. These questions would ordinarily be settled at Washington by the officials there, but it is now planned to submit them to the Board. The Board's activities for a long time in the future will be confined to meeting specific questions of this sort, and to gathering historical and other material."

Polar.

American Crocker Land Expedition.—According to a note in the *Bulletin* of the American Geographical Society for January, the

American Museum of Natural History has received a letter from Mr. Ekblaw of this expedition (cf. vol. xxix. p. 494 *et antea*). Mr. Ekblaw's letter is dated 29th August 1914, and was written from a point some fifteen miles south of Etah, on the west coast of Greenland, the headquarters of the expedition. It was conveyed by Mr. Knud Rasmussen's motor boat, which had brought letters and supplies to this point for the expedition. Mr. Ekblaw reports that in spring 1914 Mr. Macmillan, the leader of the expedition, with Ensign Fitzhugh Green, set out in search of Crocker Land. They sledged over the ice to a point 125 miles N.W. of Cape Thomas Hubbard, but were unable to find the land in the place where it was thought to exist. The ice conditions were very bad, and the return journey to Cape Thomas Hubbard was perilous, most of the dogs being lost. The letter is stated to contain few details, probably on account of the short time available before the departure of Rasmussen's boat.

General.

Foreign Geographical Societies and the War.—According to a letter which we have received from General de Schokalsky, the vice-president of the Imperial Russian Geographical Society, that Society is carrying on a modified form of activity in spite of the war. The Society has set apart the upper floor of its building, including the great hall, for hospital work, and at the time of writing was housing seventy-five wounded soldiers. In spite of this it has been able to hold some of its meetings, and the committees of the 11th International Geographical Congress are still sitting. General de Schokalsky states that it is hoped in Petrograd that it may be possible to hold this congress if not in 1916 as proposed, at least in 1917.

The French Society of Geography, whose publication, *La Géographie*, is now reappearing on our tables, has also been holding some of its meetings during the present session. A number of the journal which has recently reached us, dated August to December 1914, contains an eloquent address delivered at the opening meeting of the Society on 27th November 1914 by M. Ch. Lallemand. At the same meeting Baron Hulot, the secretary, gave a short account of the Society's activities during the war. He announced that *La Géographie*, which was temporarily suspended at the outbreak of the war, will henceforth appear as a quarterly instead of a monthly publication. At Paris, no less than at Petrograd, the nearness of the war has been reflected in the use made of the buildings of the Geographical Society. The Society has put those of its rooms which were at liberty at the disposal of the Countess Roederer, who has established there a home for young children whose fathers have gone to the war, in order to enable their mothers to go out to work. Dormitories and dining-rooms have been improvised in these rooms; and Baron Hulot speaks of the children having invaded even the lecture-hall, where they are playing "beneath the paternal but slightly surprised glance of Lapérouse and Bougainville." Baron Hulot ended his address by a pathetic list of those of the Society's active members who at the date

of his speech had already lost their lives on the field of battle. Both his speech and that of M. Lallemand are, however, full of pride in what the French armies have already done, and full of confidence in the future.

Association of American Geographers.—We are informed by Professor Isaiah Bowman that the eleventh annual meeting of this Association was held at Chicago, on December 29 and 30, 1914. The attendance of members and non-members ranged from thirty-eight to seventy-two. The officers nominated for 1915 were elected, and the full Council for the year is as follows: President—Richard Elwood Dodge. First Vice-president—Mark Jefferson. Second Vice-president—Frank Carney. Secretary—Isaiah Bowman. Treasurer—Francois E. Matthes. Editor—Harlan H. Barrows. Councillors—Robert De C. Ward, Alfred H. Brooks, William Libbey.

After five years of unusually painstaking and efficient service in establishing a high standard of publication, Professor Dodge has resigned as Editor of the *Annals* of the Association. His successor is Professor Barrows, whose appointment as Editor of the *Annals* left a vacancy on the Publication Committee which was filled by the appointment of Miss Ellen Churchill Semple.

The Round-Table Conference conducted by N. M. Fenneman resulted in definite progress in defining the limits of physiographic provinces in the United States. The retiring president (Professor Brigham) and Mr. Cyrus C. Adams were appointed a committee to name the committee that is to work with Mr. Adams in preparing a report on the raising of the standards of geographical education in the United States. Their report is to form the basis of discussion at the Round-Table Conference of December 1915. A tentative programme has already been framed for the joint meeting of the Association and the American Geographical Society in April next, and there is every indication of a good attendance. An attempt will be made to secure a programme of unusual interest.

Commercial Geography.

Transmission of Electrical Power from Sweden to Denmark.—A recent issue of *Nature* bases upon an article in *Electrical Engineering* a note upon the transmission of electric power by means of a submarine cable, a subject which is of considerable interest, and may in the future have much geographical importance. The cable in question has been laid across the bed of the Sound between the towns of Elsinore and Helsingborg, the width of the channel here being only about 3½ miles. Arrangements have been made for the transmission of a total power of 5000 kw. to Denmark, and the area supplied will include Copenhagen. As S. Sweden has abundant water-power, while Denmark has none, the scheme, if successful, obviously opens up large possibilities for the future. It is noted that while this is the first instance of a submarine supply of electric light and power for industrial purposes being transmitted from one country to another, yet there are a few existing cases where power is transmitted from one country to another by land. Thus before the

war Nancy, Toul, and Verdun received a part of their electric supply from German Lorraine, and there is similar transmission from Silesia to Austria, and from S. Switzerland to Italy. Further, the important electric works at Rheinfelden supply power to both sides of the Rhine, *i.e.* both to Switzerland and to Germany.

The Trade of Ashanti.—The *Annual Colonial Report* for Ashanti for 1913, recently received, gives some interesting figures in regard to trade. The total imports were nearly £900,000, and included a large number of cattle, which arrived largely through the northern territories from the French Muski country. The exports reached over a million, and the most important items were gold (£475,000) and cocoa (£400,000). Much less important are kola and rubber. Cocoa cultivation is spreading rapidly, and the large increase (over 25 per cent.) in 1913 as compared with the previous year was due to the fact that young trees are coming into bearing. Unfortunately, there is a good deal of disease, and it is difficult to get the chiefs to take serious measures to combat it. It is of some interest to note that the rubber trade was dormant throughout the year, owing to the competition of plantation rubber from other countries. The trade in kola nuts is increasing, but meantime depends only on the wild product; there is, however, an opening for natives to plant. The relations between the people and the administration throughout the year is said to have been good. A curious little point in regard to the native Christians, of which a certain number are scattered throughout the country, is that they occasionally cause trouble by refusing to perform hereditary personal services to their chiefs, on the ground that these services are "fetish." "In these cases the decision as to whether any particular service is or is not connected with 'fetish' is generally decided by the Commissioner."

EDUCATIONAL.

Water Supply and Physical Geography.—We have received from the Geological Survey and Museum, Jermyn Street, London, S.W., a little pamphlet, sold at the price of twopence, and entitled *Notes on Sources of Temporary Water Supply in the South of England and Neighbouring Parts of the Continent*, in which we think teachers might find many hints for lessons, in the class-room or in the open. The *Notes* were originally written for the use of the Royal Army Medical Corps, attached to the London Territorials, and their object is to illustrate the possibilities of obtaining pure drinking water at short notice by temporary works in regions where, owing to a state of war or to the vicinity of large centres of population, the running streams are suspect. As the purpose is thus utilitarian and not scientific, facts are given without reasons, and it is here that the interest of the pamphlet to the teacher comes in. A class in the field would, we think, enter with zest into the game of determining with the help of the pamphlet where springs are to be expected, how a true spring can be recognised, and so

forth ; while the discovery of the reason why spring water is colder than the air in summer and warmer in winter, why water appearing from a crack in a limestone rock may not be spring water, why it is of little use to look for springs on the side of chalk hills, why wells in gravel resting on chalk should not be too deep, and so forth, involves a nice acquaintance with the facts of physical geography. We think also that if elementary geology is to be included in geography, the teaching should be done in connection with a definite geographical problem, such as this of water supply.

Geographical Pictures.—Two packets of geographical pictures published by Messrs. A. and C. Black, and devoted to Crustal Movements, may be recommended to the notice of teachers. The views devoted to earthquake effects, and also one illustrating the rift valley of Syria, are especially striking. The much photographed Temple of Serapis is also shown with unusual clearness in the picture devoted to it.

NEW BOOKS.

EUROPE.

Highways and Byways in Lincolnshire. By WILLINGHAM FRANKLIN RAWNSLEY. With Illustrations by FREDERICK L. GRIGGS. London : Macmillan and Co., 1914. *Price 5s. net.*

Mr. Rawnsley's interests evidently lie chiefly in the direction of ecclesiastical architecture, and his book gives very full accounts of the various cathedrals, churches, and other interesting buildings in which the shire is so rich. He considers that the motor car affords the best means of getting about the country, as the railway does not penetrate the more picturesque portions, and Lincolnshire, owing to its general flatness, is hardly a country for the pedestrian. He has therefore arranged his volume chiefly with a view to the needs of the motorist, the main and minor roads radiating from the large towns being described, and the important buildings connected with them discussed. On the whole the author's interest in matters purely geographical seems to be somewhat slight, but his account of the cultivation of mustard, and also of the dye plant woad in the Spalding district, and the brief discussion of the process of "warping" in the Isle of Axholme are points of which the geographer may well take note. Lincolnshire is rich in literary and historical associations, and of these Mr. Rawnsley makes the most, Tennyson, the poet of Lincolnshire, coming in for a large share of attention. There is a useful road map of the county.

ASIA.

Lands and Peoples of the Bible. By REV. JAMES BAIKIE, F.R.A.S. London : A. and C. Black, 1914. *Price 3s. 6d. net.*

Mr. Baikie has done a good service by his book to those anxious to keep pace with the discoveries in Egypt, Palestine, and the great Euphrates valley, in so far as they affect the Scripture record. With fresh unfoldings of the long buried treasures of the past by so many different societies, from so many different lands, all working in this extensive field, it is difficult to know the latest that the pick and spade have said. Mr. Baikie has carefully searched these records ; he has not

merely presented the dry bones of detail, but clothed them in living flesh and blood. The class of young men and women to whom the chapters of his volume were first delivered were fortunate in having a teacher with such a mastery of his subject and power of portrayal: and it was wise on his part to give the benefit of his studies to a wider public. He divides his field into three sections, Palestine, Mesopotamia and Babylonia, and Egypt. He supplies a bibliography at the end, by the help of which the latest in more detail of these excavations can be learned, enriches his book with about fifty illustrations and a map of the world bearing on the times, and provides a good index, and a comparative chronological list.

Through Siberia: The Land of the Future. By Fridtjof Nansen. London: Wm. Heinemann, 1914. *Price* 15*s.*

This work is the outcome of a journey through Siberia made on the occasion of a renewed attempt to open up a sea way to Siberia, of which an account was given in the *Geographical Journal* for May 1914. It is well known that repeated attempts to establish such a sea route had been made in the latter part of last century, but they all failed in the end to prove remunerative. The hope of the new venture was based on the idea of the new means placed at our disposal by aeroplanes and wireless telegraphy for obtaining information about the distribution of the ice in the Kara Sea. Whether such ventures will ultimately prove to be remunerative or not remains to be seen, but in any case it would not appear likely that they will ever be the means of maintaining an extensive commerce with so vast a country as Siberia. The bulk of the volume, however, relates not to this project, but to the results of the journey which Nansen made after the conclusion of the voyage, a journey in which, after ascending the Yenisei, he followed the Trans-Siberian Railway eastwards to the coast, and then returned by the route of the Amúr railway, which is now approaching completion. Among the interesting particulars given by the author are the figures with regard to Siberian settlement. He points out that Siberia remained almost unpeopled at a time when Russia was sending out numbers of emigrants to America, a total, he says, amounting to at least half a million in the ten years from 1891 to 1900. A change began, however, after the Japanese war of 1904-5, and a great step favouring immigration was the abandonment of the practice of sending convicts to Siberia. In the three hundred years from 1596 to 1896 the number of immigrants into Siberia is put down by Nansen at about three millions. In the ten years from 1896 to 1905 the total was 1,370,000. The following figures give in thousands the number of immigrants for each year from 1906 to 1913, making a total of nearly 3,500,000 in eight years, though some allowance has to be made for those who return each year:—

1906	1907	1908	1909	1910	1911	1912	1913
267	577	759	708	353	226	260	327

With regard to the declining immigration since 1909 Nansen informs us that that was at least in part due to a succession of bad years, as well as to the operation of conditions favourable to internal settlement in Russia proper, but it is somewhat striking that he has to add that one of the causes tending to slacken the rate of immigration is that the supply of free and easily accessible land has been considerably diminished, so that the immigrants are forced year by year into more unfavourable tracts, such as the taiga, and the half-desert regions of the southern Kirghiz (pp. 284-87). On the other hand, the abolition of the mir in Siberia by Stolypin in 1910 is probably also to be regarded as a circumstance that will favour

immigration from Russia in the future. Nansen tells us (p. 242) that the mir is still perpetuated by custom, but for all that not only are there freehold farms owned by new settlers, but the older colonists have the right to get their apportioned land assigned to them as freehold, an indication that the abolition of the mir is really taking effect. In the districts of Yeniseisk and Kansk in 1912 as much as 34,452 acres were transferred from common ownership to separate holders. On page 299 there is an interesting comparison of the yields of grain in Siberia, Russia, Norway, and the Nordland provinces of Norway. On the average of the years 1906-9 they are as follows in bushels per acre :—

	Wheat.	Rye.	Oats.		Wheat.	Rye.	Oats.
Siberia, . . .	10	10·5	18·4	Norway, . .	24·8	27·6	39·5
Russia, . . .	7·8	10·1	16·2	Nordland, . .	...	17·3	28·6

These Siberian yields are small compared, for example, with those of Canada, and by all accounts this cannot be put down either to inferior soil or inferior climate. It is no doubt due to backward methods of cultivation, the result in all probability of the inadequate means of the Siberian immigrants. The size of the allotments granted to immigrant farmers as freeholds varies from about 67 to 135 acres to each family. The laying of the Amúr line was another of the results that the Japanese war of 1904-5 gave rise to. It had indeed been originally intended to continue the Siberian Railway along the valley of the Amúr to the mouth of the Usuri, but ultimately a more direct route was taken to Port Arthur through Manchuria. After the peace of 1905 the southern part of the Siberian Railway passed into the hands of the Japanese, and that made it natural that the project of a line through the Amúr district should be taken up again ; and when this was done, instead of making the line run through the most thickly populated district near the Amúr, where it would have been close to the Chinese frontier and thus too exposed in the case of war, it was determined to lay it further within the country where it would be more protected, but would run for the most part through entirely uninhabited tracts. Some interesting information, however, is given by Nansen as to the effect of this railway, so far as it is yet completed, in attracting population. We would refer the reader in particular to the accounts which he gives on pages 384, 400, and 403 of the wide, flat Bureya-Seya plain. The length of the railway from Kuenga on the Sryetensk branch of the Siberian Railway, a little to the east of Nerchinsk, to Khabaróvsk is 1213 miles. Its cost so far has been at the rate of £26,150 a mile. Among the effects of physical conditions in Siberia the following illustration will be interesting to many (pp. 403-4) :—

"A new bridge was built on wooden piles which were driven into the mud, but as the depth was great, the piles had to be joined. When the engineers returned last spring, the bridge was twisted quite out of the level ; some of the piles were raised 12 inches. When they were dug out it was seen that ice had formed in the joints, forcing the baulks of timber apart and forming a column of ice of the same section as the pile and 12 inches high. This must have been through the water finding its way into the joints, where it froze, expanding as it did so and thus forcing the baulks apart. But then the temperature of the ice was further reduced and it contracted again. A small interstice was formed where fresh moisture could penetrate, freeze, crystallise out again, expand, force the baulks still more apart, and then contract on further cooling, leaving space for more water, and so on. On the sides round the ice the moisture may freeze in a similar way ; but as the frozen soil surrounding the hole offers too great resistance, the ice cannot expand in this direction, but must press upwards where there is less resistance.

Iron bands had been placed over the joints in the piles, and these were attached with nails, which had naturally been forced out by the expansion of the ice; but these bands had, nevertheless, prevented the piles from sinking again when the ice contracted after freezing, and in this way interstices were constantly forming."

AFRICA.

A Camera Actress in the Wilds of Togoland: The Adventures, Observations, and Experiences of a Cinematograph Actress in West African Forests whilst collecting Films depicting Native Life and when posing as the White Woman in Anglo-African Cinematograph Dramas. By Miss M. Gehrts. With an Introduction by Major H. Schomburgh. With 65 Illustrations and a Map. London: Seeley, Service and Co., Ltd., 1915. *Price* 12*s.* 6*d. net.*

The title of this book, not to speak of the alarmingly exhaustive sub-title, undoubtedly saves a reviewer from one part of his task. One need not say what it is about. This apart, the volume is an unpretentious but brightly written narrative of what must still be considered an unusual experience. Miss Gehrts, although young, is obviously a "film-actress" of some experience, but, whilst attending strictly to business, she kept her eyes open, and has succeeded in making an interesting, lively, and occasionally instructive book. Her references to native modes of life, customs, and industries show a capacity for observation that is far from superficial. As might be expected, the illustrations are numerous and excellent. A sketch map at the end shows the extent of her travels, as well as the political boundaries of the colony, which will now require readjustment. An adequate index completes the volume.

Through Unknown Nigeria. By John R. Raphael. London: Werner Laurie, Ltd., 1914. *Price* 15*s. net.*

Mr. Raphael was commissioned by his paper to make a journey along the railways and through the tinfields of Northern Nigeria, and to set down *en route* his impressions of the country and its inhabitants. The present volume appears to be largely made up of selections from articles already published in the *African World*. The tour is described in a very readable and temperate manner, the journalistic touch being for the most part unobtrusive, except in the title. It is not customary to term "unknown" a region which is being actively administered, through which a railway has been constructed, of which fairly accurate maps are obtainable, and in which a considerable mining industry has already been established. The title "Unknown Nigeria" conjures up visions of pioneer work of which there is still plenty to do, but the author appears never to have left the beaten track through the most accessible parts of the country.

None of our younger possessions has been so frequently described in books as Nigeria, largely owing to the extraordinary interest of the country itself. Many of Mr. Raphael's observations and opinions are therefore not new to those who are conversant with the literature, but he has the knack of presenting them in a fresh and vigorous manner which will do much to keep alive popular interest. Perhaps the most valuable parts of the book are those in which the author gives a description of the amenities of travel along the railway line, and throughout the tinfields. Changes in the methods and improvements in the facilities of transport have been taking place rapidly in Nigeria of recent years, and Mr. Raphael now brings the account of these changes and improvements up to date. The only point which is lacking, and which would have been of the greatest interest and value, is a statement of the expenditure which a private individual might reasonably expect to incur in the course of a journey from London to Kano or Naraguta and back.

Of the many interesting subjects lightly touched upon throughout the volume, one only may be selected for special notice. Mr. Raphael refers to the high invaliding and death rate which formerly prevailed amongst officials in Northern Nigeria and which has been attributed largely to bad housing. He suggests, however, that caution should be exercised in drawing conclusions from the latest figures, which appear to indicate a very considerable lowering of the rate, and that it may be that tropical illnesses in the same station or region may show a periodic rise and fall in a cycle of years, independent of medical and sanitary conditions. One wonders whether the author's suggestion would be accepted by local scientific opinion.

AMERICA.

A Conversational Tour in America. By E. H. Lacon Watson. London: Elkin Matthews, 1914. *Price* 2*s.* 6*d. net.*

America in Mr. Lacon Watson's sense includes Canada, to which the greater part of the book is devoted, and the United States. In a bright, vivid, entertaining fashion he carries you to New York, thence to Boston so "full of memories, historical and literary," and then crosses to Canadian territory. Quebec, where he first plants his foot, he recognises as "surpassingly beautiful at a distance," but on nearer acquaintance, enjoying "no great reputation for cleanliness." He thereafter turns westward through the great cities to Vancouver and Seattle, drops down to San Francisco, and strikes eastward by Chicago for the homeland—a three months' tour. The conversation, always lively, is lit up with many tall stories, and with interviews with strange personalities. Scenery, manufactures, buildings do not interest Mr. Watson so much, he tells us, as the men and women of a country. "I would walk three miles to converse with a man of intelligence rather than one mile to see a waterfall." This is the keynote of his chatty talk, in which the shrewdness and humour of the writer stand out conspicuous.

Through the Grand Canyon from Wyoming to Mexico. By E. L. Kolb. With a Foreword by Owen Wister. With 48 Plates from Photographs by the Author and his brother. New York: The Macmillan Company, 1914. *Price* 8*s.* 6*d. net.*

The descent by boat of the Grand Cañon of the Colorado River has attracted many adventurous spirits, and it has been several times successfully accomplished. The narrow valley, a mile below the level of the surrounding country, is a kind of new world, with climate and vegetation peculiar to itself and strange to the inhabitants above. The brothers Kolb set out from Green River, Wyoming, and completed the trip to the Gulf of California in three stages. Their main purpose was photography; and, judging from the specimens in the book, they were eminently successful. They were the first party to carry a moving-picture camera, and doubtless we shall in due course see on the screen reproductions of their exciting experiences in the rapids. The accompanying narrative is simple and straightforward. Many of the photographs give a vivid idea of the grandeur of the scenery.

GENERAL.

Hazell's Annual for 1915. Edited by T. A. Ingram, M.A., LL.D. London: Hazell, Watson and Viney, 1915. *Price* 3*s.* 6*d. net.*

The present issue of this *Annual*, which is revised to November 25, 1914, in addition to the usual articles, contains an interesting account of the war to date,

including its origin and the financial crisis which took place at the time of the outbreak. Apart from this absorbing subject, we have to notice the sections devoted to the March of Science, which, as usual, are clear and full. There is a good article on the Australian Meeting of the British Association, and, in the section devoted to the progress of the separate sciences during the period since the last annual issue, a considerable amount of space is given to geography. In regard to this article two points are of special interest to geographers. The first is that it is entirely devoted to summaries of journeys of exploration, no other aspect of the science being considered, and second that in regard to exploration Polar regions take by far the most prominent place, while Asia follows. We note that in the geological section a few important recent books are mentioned: this is a useful feature which might well be extended to other articles. The great variety of the subjects discussed makes the book a valuable work of reference.

Economic Geography. By JOHN M'FARLANE, M.A., M.Com. 560 pp. London: Sir Isaac Pitman and Sons, Limited, 1914. *Price 7s. 6d. net.*

The distinguishing feature of this book is a description of the earth by natural regions. It is accordingly similar in treatment to Hettner's volume on Europe. Eleven out of the eighteen maps with which the work is illustrated show the division of various countries into natural regions, the others being rainfall maps based on the Oxford wall maps. From the point of view from which the subject is treated the work is admirably done. The natural regions are outlined with judgment. The descriptions are lucid and well proportioned. The details are well selected, and the utmost pains have been taken to ensure accuracy. There is, in fact, no English book on the subject containing such a wealth of minute and trustworthy, up-to-date information. In the preface the author quotes from Professor Herbertson an expression of the opinion that by this method of treatment "the memory is not burdened by such a plethora of place-names." But if any one can manage to retain with any significance the number of place-names that are to be found in this volume, he will at least have no reason to complain of his memory. But while little exception can be taken to the manner in which the author has carried out the main idea of this book, many geographers will be disposed to question the contention in the preface that "the ultimate task of the geographer is the recognition, classification and examination" of natural regions. While Mr. M'Farlane contends that the true natural region is "a unit—physically, climatically, and biologically," he recognises to begin with that there must be a good deal that is tentative and even arbitrary in the marking out of such regions. A mere comparison of certain of the maps will at once suggest that to the mind. Perhaps the two that may be compared with most advantage are those of Great Britain and New Zealand, inasmuch as these areas do not differ very widely in extent, and in making that comparison one cannot help being struck with the smallness of some of the divisions of the natural regions in New Zealand, while on the other hand, the whole area of Scotland to the north-west of the Great Rift Valley is regarded as forming one of the natural regions, thus leaving, for example, the tract upon the south shore of the Moray Firth, the geographical importance of which has again and again been illustrated in the history of Scotland, unrecognised as apart from the strictly highland regions. Again, Mr. M'Farlane on page 373 finds himself obliged to recognise as forming one of the natural regions the Middle Appalachian States with the corresponding part of the coastal plain, in spite of "differences in topography, climate and products." He considers that it

is above all the great coal supplies of that region that knit these areas into one, a view which nevertheless rather disguises the facts, which he points out in detail on pages 406 and 409, showing the want of intimate connection between the locality of the coal supplies and the manufacturing districts of the United States. As a matter of fact, with all that is to be said in favour of this method of treating geographical data, one is driven to suspect that it has a tendency to limit the view, and blind one to the wide geographical relations which in many cases are of more importance than the same local conditions in determining the geographical significance of regions and the great cities which they may contain. Where the method of description by natural regions is followed, we think therefore that it would be well to supplement it more systematically by wider surveys. To descend to small points, we would suggest, for the sake of those who have sensitive nerves, that in future editions the expression "navigable waterways," which occurs on pages 97, 135, 148, and perhaps elsewhere, should be abandoned. A more important suggestion is that the numbering of the parallels and meridians on several of the maps should be made larger. In several cases the numbers referred to are so small as to be almost illegible.

NEW MAPS.

EUROPE.

GEOLOGICAL SURVEY OF SCOTLAND.—Scale 1 : 63,000 or 1 inch to a mile. Sheet 110—Latheron, Sheet 116—Wick. Published in colour. 1914. Price 2s. 6d. net. *Ordnance Survey Office, Southampton.*

ADMIRALTY CHARTS—SCOTLAND.

Scotland, North and East Coasts, with the Orkneys and Shetland.—Corrections to 1914. No. 2397*b*. Price 4s.

River Forth and Carron River to Stirling. Scale 1 : 18,260. Corrections to 1914. No. 114*d*. Price 3s.

River Tay.—Scale 1 : 24,180. Corrections to 1914. No. 1481. Price 3s.
Admiralty Office, London.

SALISBURY PLAIN DISTRICT.—Touring Map by J. Bartholomew, F.R.G.S. Scale half an inch to a mile. 1915. Price 1s. net; mounted on cloth, 2s.
John Bartholomew and Co., Edinburgh.

EUROPEAN WAR MAPS.

"Daily Mail" World Map of War and Commerce. Including a series of Picture Diagrams.—Size 30 by 40 inches. Price 1s. net. 1914.
George Philip and Son, Ltd., London.

Johnston's New Contour Map of Eastern War Area.—From Berlin to Petrograd. Scale 1 : 2,280,000. Price 1s. 6d. net. 1914.
W. and A. K. Johnston, Ltd., Edinburgh.

Johnston's New Contour Map of Western War Area.—From Paris to Berlin. Scale 18 miles to 1 inch. Price 1s. 6d. net. 1914.
W. and A. K. Johnston, Ltd., Edinburgh.

Philip's Contour War Map of Europe.—Scale 63 miles to 1 inch. Price 1s. net. 1914. *George Philip and Son, Ltd., London.*

Philip's Photo-Relief Model War Map of Central Europe.—Price 1s. net. 1914.
George Philip and Son, Ltd., London.

Philip's Large Scale Strategical War Map of Europe.—Central and Eastern Area, with Complete Index. Edited by George Philip, F.R.G.S. Scale 1 : 1,140,000 or 18 miles to an inch. 1915. Price 2s. 6d. net.

George Philip and Son, Ltd., London.

ASIA.

SURVEY OF INDIA, QUARTER-INCH MAP. 1913-1914.

Scale 1 : 253,440 or 1 inch to 4 miles. Price 1 Rupee each sheet.

Assam, etc.—Sheets 78 J, 78 K, 78 L.
Bengal, etc.—Sheets 72 P, 78 C, 78 D, 78 F, 79 C, 79 G, 79 K, 79 N.
Berar, etc.—Sheet 55 H*. Layered and shaded issues.
Bihar to Orissa, etc.—Sheets 63 N, 63 O, 64 M, 64 N, 72 G, 72 K, 72 L.
Bombay, etc.—Sheets 46 K*, 46 O, 47 I.
Burma.—Sheets 93 K, 93 L.
Central India, etc.—Sheets 64 E, 64 I.
India and China.—Sheet 92 K.
Madras, etc.—Sheets 49 M*, 49 N*.
Nepal, etc.—Sheets 63 M, 72 B, 72 F, 72 J.
Punjab, etc.—Sheets 38 P*, 39 I*, 43 B*, 43 C.
United Provinces.—Sheet 63 J.

* The sheets marked with asterisk are issued with layer colouring as well as the ordinary issue with hill shading in brown.

SURVEY OF INDIA, ONE MILLION MAP. 1913-1914.

Scale 1 : 1,000,000 or 16 miles to an inch. Price 1 Rupee each sheet.

India and adjacent Countries.—Sheets 39*, 41*, 53*, 56*, 83 and part of 86, 94.

* The sheets marked with asterisk are also issued with layer colouring.

SURVEY OF INDIA, SOUTHERN ASIA SERIES. 1912-1914.

Scale 1 : 2,000,000 or about 32 miles to an inch. Price 8 Annas each sheet.

Northern Persia Sheet.—Layer colouring and also with hills in brown.

Southern Persia Sheet.—Layer colouring and also with hills in brown.

SURVEY OF INDIA.

General Map of India and Adjacent Countries.—Scale 1 : 2,027,520 or 32 miles to an inch. Layer colouring. In 12 sheets. Price 12 Rupees.

Survey of India Office, Calcutta.

AMERICA.

ALBERTA, NORTHERN.—Map showing Disposition of Lands, 1914. Scale 1 : 792,000. J. E. Chalifour, Chief Geographer.

Department of the Interior, Ottawa.

ONTARIO.—Standard Topographical Map. Scale 1 : 250,000 or about 4 miles to an inch. Cartier sheet, 8 NW. J. E. Chalifour, Chief Geographer. 1914.

Department of the Interior, Ottawa.

UNITED STATES SURVEY.

Topographic Sheet, Niagara Gorge.—Scale 1 : 12,000 or about 5¼ inches to a mile. 1914.

Montana, Panoramic View of the Glacier National Park.—Scale 1 : 187,500. 1914. *United States Geological Survey, Washington, D.C.*

AFRICA.

EGYPT AND THE LOWER NILE.—Bartholomew's New Map prepared from the latest surveys. Scale 1 : 1,000,000 or 16 miles to an inch With inset maps of Cairo and Alexandria. 1915. Price 2s. net ; mounted on cloth, 3s. net.

John Bartholomew and Co., Edinburgh.

This map extends from the Delta to Wady Halfa, and is on a large enough scale to show all places of importance.

SOUTHERN NIGERIA.—Scale 1 : 125,000 or about 2 miles to an inch. Published under the direction of Major F. G. Guggisberg, C.M.G., R.E., Director of Surveys, Southern Nigeria. 1914. Sheets—Ilesha, Iwo. Price 1s. 6d. net each sheet. *W. and A. K. Johnston, Ltd., Edinburgh and London.*

AUSTRALIA.

VICTORIA.—Geological Survey. Sheets : Myrtleford, Stanley.—Scale 1 : 31,680 or 2 inches to a mile. 1914.

Geological Sketch Map of Werribee Gorge and Adjacent Country.—Scale 1 : 63,360 or 1 inch to a mile. 1914.

Geological Survey of Victoria, Melbourne.

GENERAL.

WORLD.—The Map and its Story : A Physical Atlas. Containing 44 maps. 1914. Price 1s. net. *G. W. Bacon and Co., Ltd., London.*

A clear and useful school atlas illustrating the main features of physical and commercial geography. The maps are accompanied by descriptive text.

WORLD.—Bacon's Sixpenny Contour Atlas. Cr. 4to. 36 maps. 1914.

South-East England Edition. Price 6d. net.

South Scotland Edition. Price 6d. net.

G. W. Bacon and Co., Ltd., London.

These are excellent little atlases for teaching elementary physical geography. The local editions have special large scale maps of the region dealt with.

THE BIBLE ATLAS.—New Edition revised by E. Robertson, B.D., D.Litt. 1914. Price 1s. net. *W. and A. K. Johnston, Ltd., Edinburgh and London.*

A series of 16 pages of maps specially designed for scholars of Sunday Schools and Bible Classes.

PHILIP'S COMPARATIVE WALL ATLASES. Edited by J. F. Unstead, M.A., D.Sc., and E. G. R. Taylor, B.Sc. With Explanatory Handbooks for Teachers. 1914. Price 27s. 6d. each, mounted on cloth.

North America.—A series of 8 maps as follows.

South America.— Do. do.

List of Maps in each Atlas.

1. Relief of Land ; 2. Political ; 3. Summer Climate ; 4. Winter Climate ; 5. Temperature ; 6. Natural Vegetation ; 7. Economic ; 8. Density of Population. Size of each map, 43 by 33 inches.

George Philip and Son, Ltd., London.

We have already commended these excellent wall atlases, and it is sufficient to say that the two sets just published are equally deserving of praise.

ATLAS OF ECONOMIC GEOGRAPHY.—By J. G. Bartholomew, LL.D., with Introduction by Professor L. W. Lyde, M.A. A series of 96 pages of coloured maps, with 64 pages of descriptive text. 1914. Price 5s. net.

Oxford University Press, London.

This atlas will be reviewed elsewhere.

BOOKS RECEIVED.

A Pilgrim's Scrip. By R. Campbell Thompson. With Illustrations and a Map. Demy 8vo. Pp. 345. *Price* 12*s.* 6*d. net.* London: John Lane, 1915.

The New Map of Europe, 1911-1914. *A Study of Contemporary European National Movements and Wars.* By Herbert Adams Gibbons, Ph.D. Demy 8vo. Pp. xv+382. *Price* 6*s. net.* London: Duckworth and Co., 1914.

Physical Geography. By Philip Lake, M.A. Crown 8vo. Pp. xx+324. *Price* 7*s.* 6*d. net.* Cambridge: University Press, 1915.

Heaton's Annual. The Commercial Handbook of Canada and Board of Trade Register. Eleventh year, 1915. Edited by Ernest Heaton, B.A. (Oxon.), and J. Beverley Robinson. British Edition. *Price* 5*s.* Toronto: Heaton's Agency, 1915.

The East I Know. By Paul Claudel. Translated by Teresa Frances and William Rose Benét. 8vo. Pp. xiii+199. *Price* 5*s.* 6*d. net.* London: Humphrey Milford, 1915.

An Introduction to General Geography. By Alec. A. Golding, B.Sc. Crown 8vo. Pp. x+222. *Price* 4*s.* Cambridge: University Press, 1915.

Russia of the Russians. By Harold Whitmore Williams, Ph.D. With 32 full-page Plate illustrations and Map. Crown 8vo. Pp. 430. *Price* 6*s. net.* London: Sir Isaac Pitman and Son, Ltd., 1914.

Cyprus: A Short Account of its History and Present State. By Col. A. O. Green, (late) R.E., F.R.C.I. Demy 8vo. Pp. ix+120. *Price* 2*s.* 6*d. net.* Kilmalcolm: M. Graham Coltart, 1914.

The Three Southern Continents. (Junior Regional Geographies.) By J. B. Reynolds, B.A. Crown 8vo. Pp. viii+184. *Price* 1*s.* 4*d.* London: A. and C. Black, 1915.

The British Empire Beyond the Seas: Junior Geography. (The Atlas Geographies.) By Thomas Franklin, E. D. Griffiths, B.Sc., F.R.G.S., F.C.S., and Ernest R. Shearmur, B.Sc. Imp. 8vo. Pp. 50. *Prices* 7*d.* and 10*d. net.* Edinburgh: W. and A. K. Johnston, Ltd., 1915.

Arabia Infelix: or The Turks in Yamen. By G. Wyman Bury. With Illustrations and Maps. Demy 8vo. Pp. x+213. *Price* 7*s.* 6*d. net.* London: Macmillan and Co., Ltd., 1915.

Memoirs of the Geological Survey of Scotland. No. 83. Edinburgh, 1914.

Colonial Reports (Annual).—Grenada (822); Barbados (824); Mauritius (826); British Honduras (827); The Surveys of British Africa, British Honduras, Ceylon, Cyprus, Fiji, Hong Kong, Jamaica, Malay States and Trinidad (828); Tongan Islands Protectorate (829). London, 1915.

Admiralty List of Lights and Time Signals. Corrected to 31st December 1914. 9 vols. London: Hydrographic Office, Admiralty, 1915.

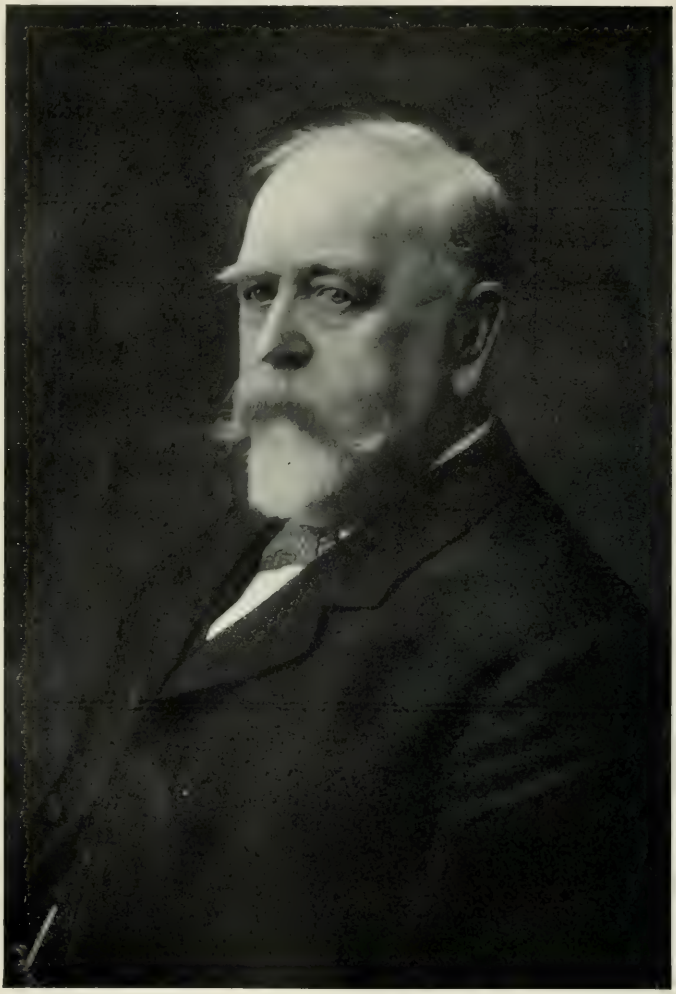
British Guiana Blue-Book, 1913-1914. Georgetown, 1914.

Diplomatic and Consular Reports.—Trade of Barcelona (5411); Moscow (5415); Bolivia (5416); German Togoland (5417); Portuguese Guinea (5418); Kermanshah (5419); Harrar (5420); Gambela (5421); China (5424). London, 1915.

Annual Statement of the Trade of the United Kingdom with Foreign Countries and British Possessions, 1913. Supplement to Vols. I. and II. London, 1914.

Guide général officiel de la Corse illustré. Pp. 96. Paris: Calavel, 1914.

Publishers forwarding books for review will greatly oblige by marking the price *in clear figures, especially in the case of foreign books.*



James Geikie

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THE SCOTTISH

GEOGRAPHICAL

MAGAZINE.

LAND FORMS AND LANDSCAPES.

By J. D. Falconer, M.A., D.Sc., Lecturer in Geography in the University of Glasgow.

(*With Illustrations.*)

(*Continued from p.* 151.)

III. The Exogenetic Processes.

The forms of Endogenetic Relief are found in a comparatively perfect state of preservation only when they are of quite recent construction, for no sooner does any part of the land appear above the sea than it is at once attacked by the agents of superficial denudation, which mould it into a great variety of secondary Exogenetic Forms. The principal superficial agents may be enumerated as sun-heat, wind, moist air, running water, frozen water, and the sea, and the aim of all superficial action is the removal of the original relief, and the reduction of all endogenetic features beneath the level of the sea.

Two distinct phases may be observed in the course of this reduction of relief—(1) the disintegration or wasting of the surface: and (2) the transportation from higher to lower levels of the resulting waste or disintegrated material, whose ultimate destiny is the floor of the sea. These may be termed the principal activities of the agents of superficial denudation, and both must necessarily be active in the degradation of the land. Without disintegration there would be nothing to transport, while without transportation the waste would gradually accumulate on the surface, and form in time a protective covering for the rocks below.

There are three different ways in which the disintegration of a surface of solid rock may take place.

(1) By the mechanical loosening of the particles of rock by alternate heating and cooling of the surface. Many rocks are composed of a mixture of minerals with different co-efficients of expansion, so that if exposed to sun-heat, and then rapidly cooled, the different minerals expand and contract to varying degrees. Cohesion is thus weakened, and the surface of the rock tends to crumble and waste away. Heating of the surface also causes a general expansion or tension of the surface layers, which tend to splinter or break down along original joint planes if these are present, or to exfoliate in flakes or sheets more or less parallel with the surface, if suitable jointing is not present. These processes may be termed the processes of mechanical disintegration.

(2) By the chemical decomposition of the surface rock in the presence of moisture. Chemical changes then take place in the composition of the rock-forming minerals. Certain constituents are removed in solution: others are combined to form new minerals, often with an increase in bulk. The general result is the weakening of cohesion and the crumbling of the surface. Where the principal minerals are not readily susceptible to chemical change the matrix may be gradually oxidised or partly removed in solution. This is known as wet weathering, and a variation of the process occurs where the sun's power is great. The moisture in the cracks of the rock becomes heated, acts more intensely as a concentrated solution, and is evaporated from the surface, leaving a hard crust of oxides beneath which is looser and incoherent rock material which crumbles rapidly as soon as the crust is broken or removed. This may be termed dry weathering.

(3) By the mechanical friction of loose particles upon the surface of the rocks, a process naturally most effective when the cohesion of the surface has been weakened by changes of temperature or by chemical decomposition. The motive power in the case of mechanical friction may be either wind or running water, and the process is usually spoken of as wind or stream corrosion.

It is conceivable that all three methods of disintegration might occur in the same locality, the intensity of each degrading influence varying with the weather; but while this is doubtless true, it has been found in the course of the investigation of the earth's surface that mechanical disintegration is naturally most effective when the atmosphere is permanently dry, and chemical decomposition in the form of wet weathering most effective where the atmosphere is permanently moist. Further, since a dry atmosphere coupled with changes of temperature affords suitable conditions for the production of violent winds, it is natural to find that mechanical disintegration is usually accompanied by predominant wind corrosion. And similarly, since a moist atmosphere, coupled with variations in temperature, gives favourable conditions for abundant rainfall, it is natural to find that chemical weathering is accompanied by predominant stream corrosion. We thus arrive at a grouping of the processes of disintegration according to climatic conditions: and since mechanical friction or corrosion implies a transporting force, it may be shown in the same way that the processes of transportation may also be grouped according to climatic conditions.

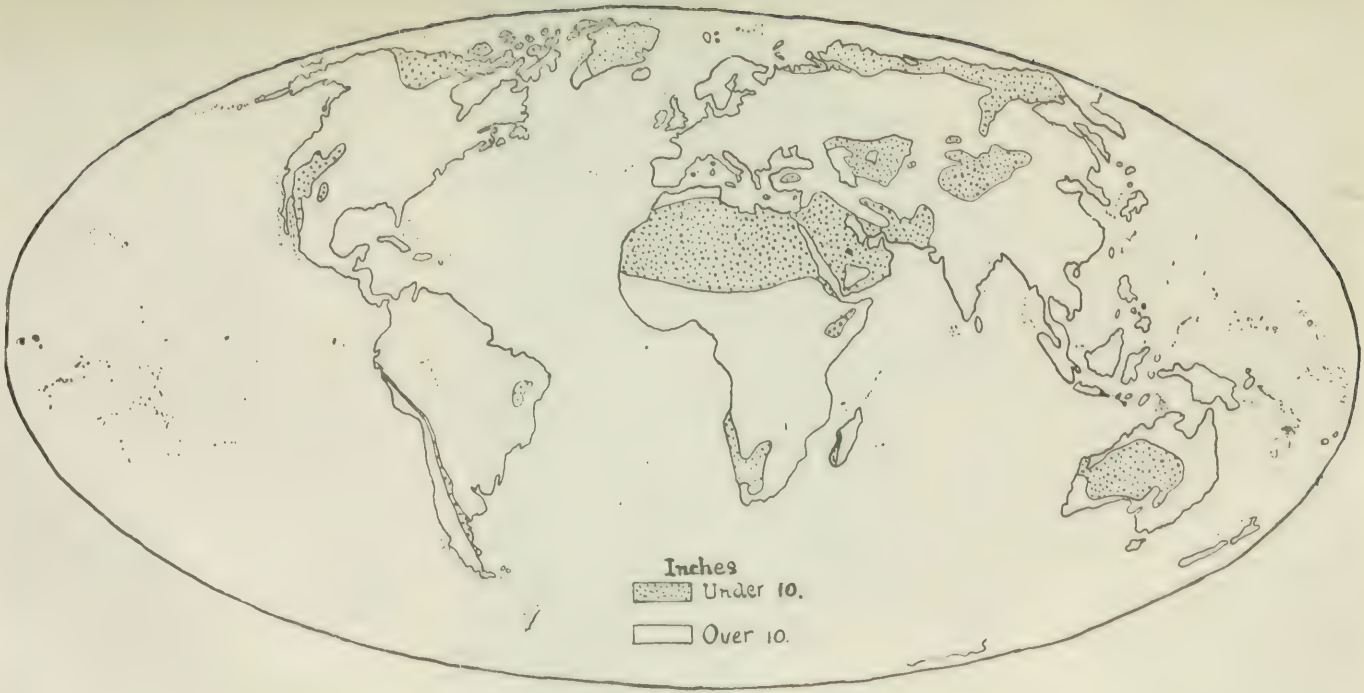

FIG. 10.—Annual rainfall.

We may therefore conclude that in the arid regions of the globe the degradation of the surface at the present day will be brought about mainly by mechanical disintegration, dry weathering, wind corrosion and transportation, while in the more humid or pluvial regions of the globe the degradation of the surface will be brought about mainly by wet weathering, solution, stream corrosion, and transportation by running water. Of this climatic influence, the corroding and transporting activities of the sea are alone independent, and we thus arrive at a threefold classification of the processes of erosion :

I. The Processes of Pluvial Erosion.
II. The Processes of Arid Erosion.
III. The Processes of Marine Erosion.

The realm of action of the processes of marine erosion is sufficiently defined as along the boundary line between land and sea, the word sea being taken to include inland seas both salt and fresh. On the other hand, the respective realms of activity of the processes of pluvial and arid erosion may be taken as coinciding generally with those regions of the land surface of the globe which have respectively more or less than 10 inches of rainfall per annum (Fig. 10). No hard or fast line can, however, be drawn between these two. Arid regions are not absolutely rainless. Heavy thunder rains confined to a small area may occur from time to time even in deserts, and in such cases the volume of water precipitated upon a small expanse of surface may lead to results of considerable magnitude in the way of stream corrosion and transportation within the limits of the desert. On the other hand, dry weathering, mechanical disintegration, wind corrosion and transportation may take place in pluvial regions on a small scale whenever weather and other conditions are favourable.

There are, for example, considerable areas of the surface in tropical and sub-tropical regions where the rainfall is concentrated into a single rainy season, which is followed by a dry season. Instead of a corresponding alternation of pluvial and arid processes, however, the influence of the pluvial conditions largely persists throughout the dry season. Though the surface may be dry and parched, the moisture is very generally retained in the subsoil, and thus serves to nourish the roots of grass and trees, which in turn bind the soil together and prevent it from being blown about by the wind. Arid processes during the dry season affect only the surfaces of bare rocks which project above the soil. These may suffer considerable disintegration, exfoliation, fission, or even dry weathering (Fig. 11). The results, however, are small and strictly local, and do not affect the inclusion of such areas within the realm of activity of the pluvial processes. Again, towards the polar and alpine limits of pluvial areas the temperature may sink at times below freezing point. Upstanding rocks then suffer rapid disintegration through repeated freezing and thawing of water in joints and cracks. The force exerted by freezing water in this way is greater than that which in other areas may be ascribed to insolation, hence the mechanical disruption of the rocks on the polar and alpine limits of pluvial regions is more pronounced than that brought about by changes of temperature

in tropical and sub-tropical areas. The total result, however, is again small as compared with the results of pluvial erosion in the same regions, and the inclusion of such areas within the realm of activity of pluvial processes is therefore again justified.

On the other hand, there may be grouped with the arid regions of the globe considerable areas of mountain and plateau land which lie at high altitudes between the snow-line and the upper limit of mountain pastures. The rainfall in mountainous regions increases to a maximum at a height determined by various climatic considerations, above which the rainfall rapidly decreases in amount. The limit of the region of abundant mountain rains may be taken as coinciding with the upper

FIG. 11.—Exfoliation in the Kilba Hills, Nigeria.

limit of trees. Above the forest zone in the mountains of Europe is the region of alpine pastures with much diminished rainfall, and above this a zone of cold scree deserts, stony wastes, and bare rock, covered with snow in winter, and in summer exposed to great diurnal changes of temperature, as well as to the action of the freezing and thawing of water in the joints and cracks. Mechanical disintegration is here the most powerful process in the degradation of the surface.

In the other continents, especially in South America and in Asia, there are considerable plateau areas, known as punas and pamirs, lying in this cold arid zone, 12,000-16,000 feet above the sea. Little moisture is precipitated, and most of it falls as snow in winter. The air is extremely dry, and contains practically none of the water vapour which at lower altitudes regulates the heat of the sun. Severe frost by night and extreme heat by day are the normal conditions, while the difference

between sun and shade temperatures may be as much as 54° F. Strong icy winds prevail and sweep away the snow as soon as it falls, together with the finer particles of debris, leaving surfaces of bare rock. The coarser material accumulates as screes and moves downward under the action of gravity, filling up the depressions between the ranges, and thus giving rise to the plateau basins which are so characteristic of Tibet and Bolivia. Occasional rains or water from melting snow may be entirely soaked up by the disintegrated material, but where the hollows have an outlet they may be drained by diminutive streams which are unable to carry away all the debris which they receive from the mountains, and therefore simply trench and terrace the valley floor.

Above the snow-line in mountainous areas, although precipitation is small, more snow falls in the course of the winter than is melted in summer or carried below the snow-line by the action of the wind. Hence it tends to accumulate in the hollows between the ridges and on slopes sheltered from the prevailing winds. The rocks which project above the snow are subject to the same processes of degradation as those immediately below the snow-line, to rapid disintegration by alternate heating and cooling, freezing and thawing, and to a very small extent by chemical decomposition. Above the snow-line, however, the disintegrated material does not accumulate. Wind carries off the finer debris, but snow and ice now fill all the hollows: the coarser material of the screes spreads out upon the ice and is slowly but steadily transported by it below the snow-line. Such high alpine areas may be conveniently classified as arid, for although the agent of transportation is different, precipitation is small, as in arid regions, chemical decomposition is at a minimum, and the disintegration of the rocks is mainly mechanical, and brought about by rapid variations in temperature. Above the snow-line in latitude conditions are very similar. In polar regions the rocks are frost-bound for long periods. Summer thaws the surface, which splinters and disintegrates, while the water sinks farther into the joints and cracks only to be frozen again in turn. With mechanical disintegration thus predominating, and precipitation small owing to low temperature, the polar regions may with equal convenience be grouped as arid. We conclude therefore that the terms pluvial and arid, as applied to areas within which certain processes are active, may be taken as denoting those regions within which chemical decomposition and mechanical disintegration are respectively predominant in the degradation of the surface.

I. The Results of Pluvial Erosion.

The various processes of pluvial erosion are exhaustively described in many text-books of physical geography and geology, and the structural and petrographical control of the results is usually amply illustrated from the details of scenery in our own and in other countries. Owing to the fact, however, that geologists are naturally more concerned with the processes than with the results, it has become customary to speak of pluvial erosion generally as "stream erosion." Valleys are

commonly said to have been formed by the rivers which flow through them: the streams remove the mountains and cast them into the sea. But while this is true in a loose and figurative sense, it should be remembered that the principal activities of rivers and streams are directed (1) to the trenching of the mountains and uplands, and (2) to the transportation to the sea of the materials of the mountains which have been loosened and prepared for transportation in various ways by the activity of quite other agents, and that it is to these other agents which work slowly and more imperceptibly that the degradation of the original relief is very largely due.

In pluvial regions the moist atmosphere and the abundance of surface water are favourable to chemical decomposition, and all rocks in such areas possess a weathered crust. The rains dissolve out of this weathered crust the soluble products of decomposition, while the insoluble residue remains behind on level ground or on gentle slopes as a loose covering of soil. In the event of heavy or continued rainfall, more rain falls than is able to be soaked up by the soil, and if the surface possesses any inclination whatever, the excess rainfall, known as the run-off, begins to flow over the surface from higher to lower levels. At first there is a general movement of the water over the whole surface, but it soon begins to gather together into rills and runnels, and to increase in velocity with increase in volume. The water which runs off in this way always carries in suspension a certain amount of finely divided soil or disintegrated material, but with increase in volume and in velocity it becomes able to move larger and larger particles, to roll them along and transport them farther downhill. This transportation of debris, however, is accompanied by friction between the particles themselves and between the transported material and the surface over which it is rolled. Consequently a definite channel is soon worn in the loose surface soil and gradually deepened through the sub-soil into the solid rock below. The tendency is therefore for the stream to produce a vertical cutting or gorge whose width bears a direct relation to the volume of the stream, and whose depth depends upon the hardness of the rocks, the elevation of the surface above the sea, and the length of time during which the stream has been running. Vertical corrosion goes on in this way until the stream has cut its channel down to such a gentle slope that it is no longer able to transport coarse sand and gravel except in time of flood. When this stage has been reached, the principal activity of the stream is diverted to lateral corrosion or planation, to undercutting its banks, which ultimately break down along the joint planes under the influence of gravity. Thus the stream begins to widen its channel and cut a flat bed for itself, the whole of which it may cover in time of flood while at low water it may become either a braided or a simply meandering stream. The material in course of transportation during flood is dropped on this valley flat as the current lessens with decreasing volume, but is liable to be transported farther downstream when the next flood comes. As time goes on the valley flat enlarges into a river-cut plain whose size and extent naturally bear a direct relation to the volume of the stream. The river, even when in flood, finds its current checked when it attempts

to spread over the whole surface of the plain. Consequently this river-cut plain tends to become more and more a plain of accumulation, covered with thick deposits of sand, and silt, and gravel. This is the normal sequence of events in river erosion, and every river shows at different parts of its course the various activities of vertical corrosion, lateral planation, and accumulation of alluvium, and according to the particular activity which is predominant at any part of its course, the river is there said to be respectively in a youthful, mature, or senile phase. Vertical corrosion is however naturally predominant in the mountain region where the slope is steep, lateral widening most active in the valley track where

Fig. 12.—The Fraser Canyon, British Columbia.

the slope of the river bed lessens, and accumulation predominant on the river plain where the slope is small.

It should be noted that these are the only important activities of the river, and that the banks of a river would remain steep and more or less vertical and abrupt throughout all three phases, if there were not other processes which attack the banks while the river itself is engaged either in vertical corrosion, lateral planation, or accumulation of alluvium. These processes lead to the tearing open of the walls and to the gradual transformation of a river-cut gorge first into a V-shaped valley and then into a valley with more or less gently sloping sides (Fig. 12). The processes mainly concerned are chemical decomposition, solution, disintegration by changes of temperature or frost action, slumping after

rain, corrosion, and transportation by the run-off. The results are under gravitational, structural, and petrographical control, but are all directed towards the flattening of the valley slopes, and the reduction of the watersheds between adjacent valleys. These are the imperceptible processes which provide the decomposed and broken rock for transportation by the streams, and it is to them, as much as, if not more than, to the obvious activities of the streams themselves, that the general degradation of the original relief should be ascribed.

It is sometimes said that the youthful phase of a river is accompanied by steeply inclined walls and the mature phase by gently rounded slopes, but this is by no means a general rule. It is truer to say that if the rate of vertical or lateral corrosion is greater than the rate of decomposition of the walls, then the walls will remain steep or highly inclined whether the stream itself be in a youthful or in a mature phase, a state of matters which is commonly found when the relief is great, as in mountainous regions. On the other hand, when the rate of decomposition of the walls is greater than the rate of vertical or lateral corrosion by the stream, the walls will flatten off though the stream may still be in a youthful phase: and this is very generally the case when the relief is low.

The ultimate aim of all the processes of pluvial erosion is the reduction of the original mountains, plateaus, and hills to the condition of a gently undulating surface, known as the peneplane, which would rise but little above the level of the sea. In the pursuit of this aim the processes of disintegration and corrosion give rise to a temporary sculpture of the crust into a great variety of Exogenetic Denudation or Degradation Forms,[1] while the processes of transportation give rise to an equally great variety of Exogenetic Accumulation or Aggradation Forms which originate during temporary halts in the progression of the disintegrated material from the mountains to the sea.

II. The Results of Arid Erosion.

Desert processes and their effects upon local scenery are, like pluvial processes, exhaustively described in modern text-books. As a rule those rocks which offer the greatest resistance to pluvial processes also offer the greatest resistance to arid processes of degradation. Hence the harder bands of rock tend to project from the degraded surface, and escarpments and dip slopes—to mention only two common features of differential decay—are equally common in arid and in pluvial regions. There is therefore a very general similarity in form between pluvial and arid features, the difference consisting mainly in the greater sharpness

[1] To geologists the important fact is that the superficial agents lay bare the solid rocks and expose the roots of the mountains, which thus become available for further examination. Hence "denudation" is the more appropriate term to use. To geographers, on the other hand, the more important fact is that the superficial agents gradually lessen and finally remove the relief of the surface, an idea which is more clearly implied in the term "degradation." In the same way, "accumulation" implies covering up the solid rock, while "aggradation" means the building of relief.

of outline in arid regions owing to the general absence of soil and vegetation. Certain degradation forms, however, such as mushroom-shaped rocks, are more especially the results of arid processes, while certain aggradation forms, such as sand dunes, of æolian origin, may surpass in magnitude and elevation the corresponding pluvial formations. Controversy now centres mainly round the question of whether desert processes may be considered efficient enough to produce the whole desert topography, or whether they have only succeeded in modifying more or less profoundly a pre-existing pluvial topography. This question, however, will be more properly considered under Landscapes.

In high mountain regions and above the snow-line, mechanical disintegration reaches its maximum, and the degradation of the rocks under the influence of insolation, frost, and thaw is, like mechanical disintegration in deserts, largely controlled by the jointing. Granite rocks in high mountain regions above the limit of trees may disintegrate into columns or needles where vertical jointing predominates, or into exfoliating domes where curved jointing is developed. Crumpled and contorted rocks break up first into irregular blocks and then into thin slabs, whose surfaces are frequently defined by the foliation planes. In sedimentary rocks with close jointing a rough and angular surface is produced as well as a talus of small angular chips and splinters. Where the rock is more massive and the joints widely spaced, great squared towers and pyramids are formed, which ultimately break down into masses of angular and subangular debris, while the resulting screes may unite to form a continuous mantle of loose material on the mountain-sides. Above the snow-line the same processes predominate, but the greater part of the disintegrated material is carried off by glaciers, while the floors of the valleys are subjected to glacial corrosion. Controversy arises mainly with regard to the amount of vertical corrosion accomplished by glaciers and with regard to the efficiency of the so-called corrie-erosion in the sculpture of glaciated uplands. The general result of erosion at high altitudes may, however, be summed up as the rapid widening of mountain valleys, the enlargement of the valley heads, the production of pyramidal peaks united by sharp ridges and arêtes, the smoothing and rounding of the valley floors by ice action above the snow-line, the marked production of talus slopes, and the accumulation of morainic and other debris in the valleys immediately below the snow-line. It should be remembered that ice corrosion and accumulation forms may be found in a more or less perfect form in regions which, owing to a climatic change, are no longer subject to glacial conditions.

III. The Results of Marine Erosion.

Compared with the agents of pluvial and arid erosion which everywhere attack the surface of the land, the sea is limited in activity to the margins of continents and islands. Marine corrosion is directed to the cutting of a terrace into the margin of the land, the terrace being bounded landward by a cliff which is worn backward by the undercutting and plucking action of the waves (Fig. 13). The structural and petrographical

characters of the rocks lead to variations in the forms of the cliffs and to irregularities in the coastline. Differences in hardness of the rocks composing the land are mainly responsible for the alternation of headlands and bays, characteristic of steep and rocky shore-lines. A limit is set, however, to this backward cutting of bays in weaker rocks by the protective action of the waves and shore currents in piling up shingle beaches and bars between the headlands. These, however, are only temporary accumulations, and are themselves removed whenever the

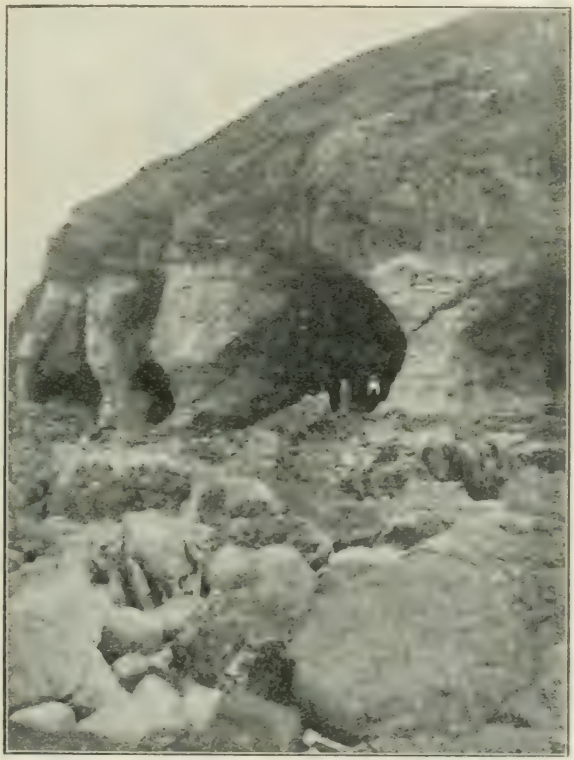

Photo by S. Kingland.

FIG. 13.—The King's Caves, Dugarie, Arran.

headlands have been sufficiently shortened. When æolian and marine accumulations, such as dunes, sandbanks, and mudflats, occur on an open coast it is very doubtful whether they are entirely the result of marine processes. The sea is primarily an agent of destruction, and all instances of accumulation by the sea should be carefully examined for signs of accompanying crustal movements. A slow upward movement would result in the shallowing of the sea, and consequent accumulation of material on the foreshore, while a downward movement would result in many instances in an apparent increase in activity of marine corrosion. Crustal movements also are responsible for the occurrence of marine-cut

plains and terraces and old sea cliffs at various heights above the present level of the sea. Sir Charles Lyell attached greater importance to the sculpturing by the sea of the slowly rising land than modern opinion is inclined to allow. It is possible that wave-cut terraces, platforms, and straits may be more numerous than hitherto believed, but the superposition of pluvial and arid features makes individual cases difficult to recognise.

(*To be continued.*)

THE DISTRIBUTION OF THE POPULATION IN MAURITIUS.

By H. E. A. Waring.

(*With Sketch-maps.*)

The population of the island of Mauritius is very dense, and is almost entirely dependent upon the sugar industry. In dealing with the distribution of the population it is convenient to consider three classes. These are the populations of the towns, of the villages, and of the estate camps.

Density of Population.—Figures obtained from the report of the last census show that Mauritius has a population of 526 persons per square mile, distributed as shown in Fig. 1. Since a large proportion of the island is practically uninhabited, the density of the people in the inhabited areas necessarily exceeds this number. In comparison, it may be noted, the average density of the population of England and Wales is 558, of Malta 2065, of Hong Kong 9907 per square mile; while, on the other hand, those of the Cape of Good Hope Province and of West Australia are but 9 and 0·2 respectively. Excluding the six towns, Port Louis, Beau Bassin, Rose Hill, Quatre Bornes, Curepipe, and Mahebourg, it is found that the density of the rural population of Mauritius is 400 persons per square mile. This dense agricultural population is largely due to the rocky nature of the ground, which necessitates the use of much manual labour.

Population and the Sugar Industry.—It has already been stated that the people of the island are engaged either directly or indirectly in the sugar industry; 82·6 per cent. of the cultivated area of the island is under sugar. The only other crop of any importance is aloe fibre, which only covers 12·8 per cent. of the cultivated land. Usually over 90 per cent. of the total exports of the island is constituted by sugar, chiefly sent to India and South Africa.

Population and Physical Features.—The general distribution of the population (Fig. 1) is controlled in part by the configuration of the land, which is indicated in Fig. 2. A plateau, varying in height from 800 to 2000 feet above sea-level, runs across the island from the south-west to the north-east. This plateau is uninhabited, except at Curepipe. The Black River Gorges, the ravines of the Black River Range, and the

Bambou Mountains likewise support no population. All the way along the west coast the population is also sparse.

Population and Rainfall.—The distribution of the population appears to have been little affected by rainfall conditions. Fig. 4 gives the total annual rainfall as well as the relative raininess of the several months:

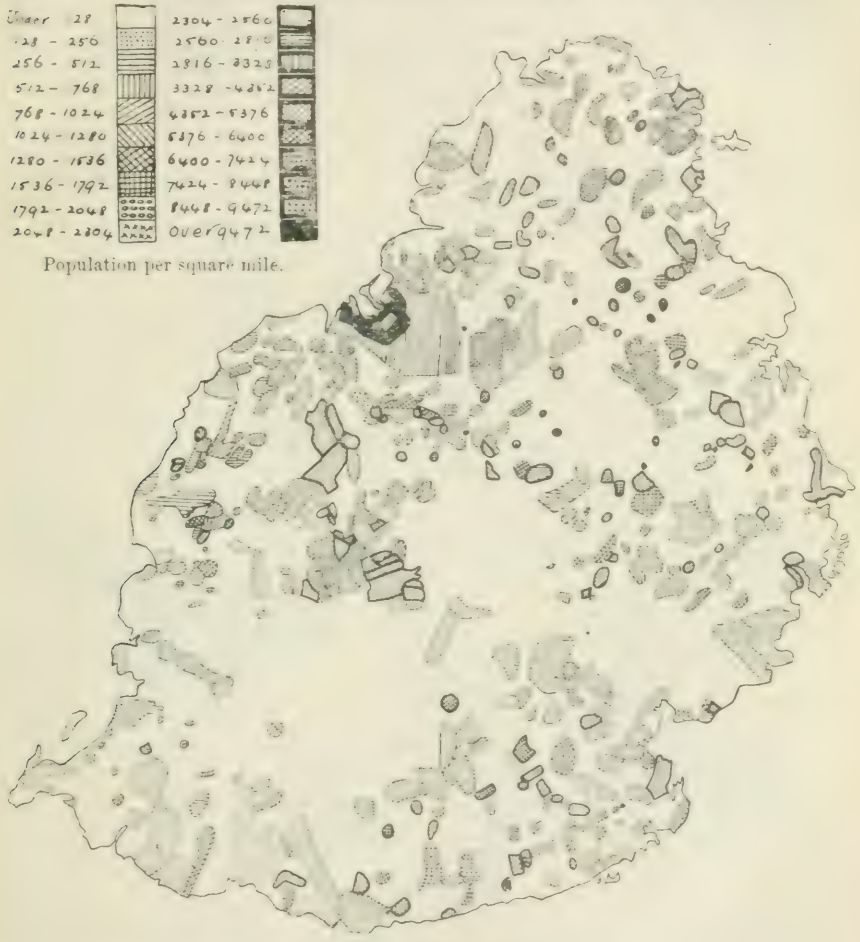

FIG. 1.—Distribution of the population.

the values there shown are based upon the figures for the 35-year period, 1871-1905. The heaviest rains occur during the three summer months, January, February, and March. The driest months are September, October, and November. It will be noticed that during the periods of heavy summer rainfall the west coast is relatively wet, especially in February. During the rest of the year the east coast is relatively wet, except in July and August, when both coasts are relatively dry, and in

November and December, when the rainfall is evenly distributed. The relative wetness of the west coast during the hottest months is interesting. The prevailing winds throughout the year are from the south east, yet the comparatively wet coast is on the lee side of the upland. The comparative wetness of either coast is never accentuated.

Fig. 2.—Relief. (Contour interval 500 feet.)

These rainfall conditions are largely due to the latitude of the island and to its smallness, for it measures but 39 miles by 28. The average annual precipitation is heaviest on the central upland, but, on the whole the distribution of the rain over the island is independent of the direction of the winds. It appears probable that the absence of population round the Mare aux Vacaos is due to the marshes caused by the abundant rains; elsewhere there seems little connection between population and rainfall.

The Towns of Mauritius.—The towns of Mauritius belong to two separate classes. The first class includes the old towns, Port Louis and Mahebourg, which are conveniently situated for sea trade, owing to their positions on bays (Fig. 3). They are also well situated for the collection of sugar from the plains near them preparatory to shipment. Both have long been important commercial centres. Port Louis contains 19,789 persons to the square mile, the densest population of the island. The intense summer heat makes disease prevalent; in 1866 an outbreak

FIG. 3.—Communications.

of malaria occurred, and since that date many Europeans have removed from the town. Port Louis remains, however, the commercial and administrative centre. Since Mahé de Labourdonnais moved the capital to Port Louis, the town of Mahebourg has declined, both in importance and in population; yet it is still the second most densely populated town, having 8762 people per square mile.

The Residential Districts.—The second class of towns include the new residential districts, of which the location is primarily due to considerations of healthiness and ease of communication. Many inhabitants of Port Louis have removed to the healthier towns of Beau Bassin, Rose

Hill, and Curepipe, and to the districts round Moka and St. Pierre. The contours of Fig. 2 show that Curepipe has an elevation of between 1500 and 2000 feet, and this height contributes largely to the healthiness of the town owing to the lower temperatures which prevail. These new districts have all grown up in the valleys of the Grand River, north-west, and its tributary the River Profonde. These rivers, like most of the Mauritian rivers, are of no use for navigation. For the most part they run at the bottom of deep densely wooded ravines. Both roads and railways, however, follow the river valleys to connect Port Louis with Mahebourg, the east coast and the south coast. In consequence the new towns have been built along the lines of communication (Fig. 3), while the importance of Port Louis has attracted the towns towards it. As a result the population of the new towns tends steadily to increase. This is specially true of Curepipe, the highest and, presumably, the healthiest of them; its population is now 4907 persons to the square mile.

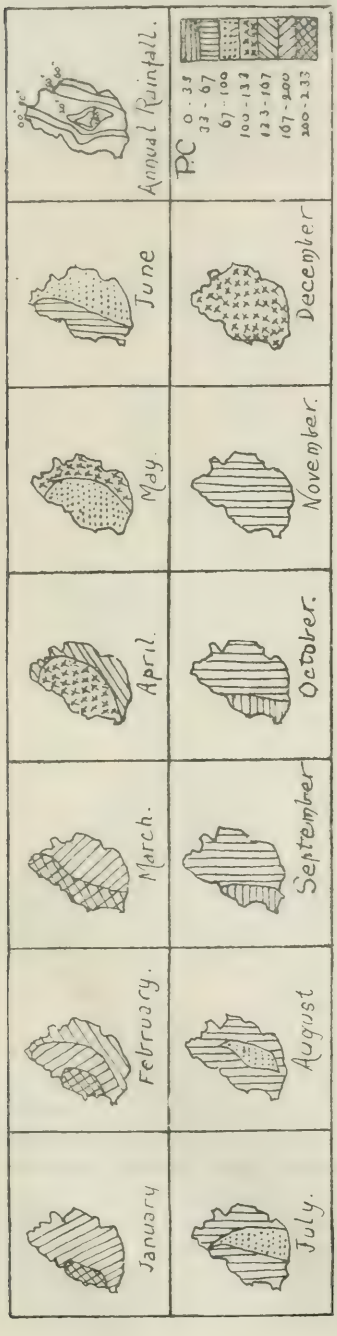

Fig. 4.—Raininess and rainfall.

Villages and Estate Camps.—The population of the villages and the estate camps is directly dependent upon the sugar plantations and estates. The areas of comparatively dense population (shown in Fig. 1), scattered over the north, south, and east of Mauritius, locate the people who fall into this class. Except in the west the agricultural population is very dense, there being, in many cases, more than 4000 persons per square mile. Among the most densely populated districts in the south are Rose Belle, a village with 6000 persons to a square mile; Escalier, a village with 4000; Savannah, a village with 10,000;

and the estate camp of Plaisance with a population density of 10,000. All these are in the south-east corner. Further to the west is the native village of Chemin Grenier. The importance of these places is indicated by the roads and railways which connect them together, and join them to the two oldest towns. All these villages are situated upon a large estate or upon plantations of Indian smallholders. In the east two of the largest sugar-mills are Sans Souci and Beau Champ, the latter being near to the mouth of the Grand River, south-east, the former lying more to the west. The population of the Beau Champ estate is about 5000 per square mile, that of Sans Souci about 4000. To the north of this is the Indian camp of Bel Etang, the population of which reaches 6000 to the square mile. Further to the east is the important village, Centre de Flacq, with several mills in the vicinity. In this district, also, the roads and railways attest the importance of the villages. In the north of the island occur the native villages of Antoinette and Fond du Sac. The latter village has the very dense population of 10,000 per square mile. Terre Rouge, which lies to the west, appears to have become a suburb of Port Louis. In the west of the island there are few plantations and therefore few people.

Conclusion.—Sugar-cane growing in Mauritius is distributed through the island in accordance with the character of the soil and the facilities for transportation. Consequently the distribution of the population has been controlled, on the one hand, by the geological, and, on the other, by the physical factors inherent in the configuration of the island. With the single exception of the new residential districts, where the controlling factor has largely been elevation of the land in relation to the health of European inhabitants, no other factor seems to have exerted any influence in spreading the people over the island; hence Mauritius provides an example of a simple case of the effect of environment in controlling the activities of man.

THE QUATERNARY ICE AGE.[1]

Designed primarily as a synopsis of and guide to recent literature on glacial geology, much of which has been studied only by specialists, this volume is, however, by no means a mere compilation. The author throughout criticises the evidence from the point of view of the monoglacial hypothesis, and in several aspects of the subject—and notably in his development of the theory of Isostacy—original ideas are introduced, which will prove of much interest to his fellow-workers.

Two concise and lucid chapters on "Glaciers and Ice Sheets" and on "Glacial Drifts" form an excellent introduction to the main theme, the Quaternary Glaciation of Europe and North America. Descriptive accounts are given of the succession of glacial deposits in Great Britain,

[1] *The Quaternary Ice Age.* By W. B. Wright, of the Geological Survey of Ireland. Pp. xxiv+464, with 23 plates and 155 text-illustrations. London: Macmillan and Co., Ltd., 1914. *Price* 17*s.*

in northern Europe, and in the Alps. The chapter on the glaciation of the Alps forms an admirable synopsis of Penck and Brückner's *Die Alpen im Eiszeitalter*. Much of the interest of the author's treatment of European glacial deposits centres round the inter-glacial question. He considers that "the elaborate systems of the older inter-glacialists may all be set aside as unproved" since "the class of evidence on which they were founded will not stand critical examination," and holds that "we are bound to take our stand on the comparatively simple mono-glacial hypothesis until we can prove at least one inter-glacial period." But despite this severe condemnation of the systems of the inter-glacialists, he accepts Penck and Brückner's classification of the Alpine deposits, a classification which after all may be closely paralleled by Professor James Geikie's correlation of the glacial and inter-glacial deposits of Europe. He states that it would be outside the scope of his book to discuss all known deposits of possible inter-glacial age and that the verdict in any case would only be a negative one. Nevertheless, throughout the volume one meets with instances of deposits designated inter-glacial and in each case admitted as proving climatic oscillations of more or less magnitude. Most convincing, perhaps, are the Eemian deposits of North Germany, Denmark, and Holland, the known width of the belt of which extends to about fifty miles. The author quotes from recent researches of Madsen, Nordmann, and Hartz, and concludes that the presence of certain southern species in the marine fauna implies a recession of the ice-front of considerably more than fifty miles, admitting "even a high probability of complete disappearance of the ice." In this instance, at least, recent work has confirmed the opinions of the older inter-glacialists. Writing on the Weimar inter-glacial deposits Mr. Wright concludes that a temperate period intervened between the maximum of glaciation and the cold period represented by the newer drift-sheet. He holds that the extent of the retreat of the ice during this temperate period must long remain a matter of opinion, but inclines to the belief that it was inconsiderable. He considers that of the many "inter-glacial" deposits between the older and the newer drift of England only one, the shell-bearing clay of Kirmington, in North Lincolnshire, has stood the test of critical examination. In this instance, he admits that there seems to have been "something more than a mere oscillation of the retreating ice-margin," since there is a marked difference in the denudation exhibited by the older and the newer drifts. Evidence of inter-glacial conditions is also admitted in the famous deposit of Hoxne, in southern England, where, as Clement Reid's investigation of the fossil flora has shown, the Acheuléen period was, at least in part, contemporaneous with or later than a cold period, which was in its turn separated from the period of the chalky boulder-clay by a temperate or inter-glacial period.

A concise summary of the work that has been done on the glacial deposits of North America is followed by a useful chapter on the Quaternary Lakes of the same region. Mr. Wright appears to admit the inter-glacial character of the well-known Toronto beds. He considers that, taken in conjunction with the undoubted duplication in the rise

of Lakes Bonneville and Lahotan, and the peculiar time relation there established, they seem to point to the conclusion that America has suffered two distinct glaciations, the last of which was relatively recent, and separated by a very long interval from that which preceded it.

The author's stand on the mono-glacial hypothesis appears to be a very insecure one. Proof of the kind he demands—and he admits that an inter-glacial period is a difficult thing to prove—may be absent or unsatisfactory in many instances, and thus there is room for differences of opinion in the correlation of the glacial and inter-glacial deposits of different areas. The *principle* of great climatic oscillations, however, postulated by the older inter-glacialists is clearly established; the mono-glacial hypothesis, on the other hand, is undoubtedly disproved.

One of the best chapters in the book is that devoted to the loess. The author discusses its character and origin, its fauna, and its relation to glacial deposits. He advances Penck's arguments in favour of loess-formation as the concomitant of oncoming glaciation. In the two immediately succeeding chapters Quaternary Mammals and Quaternary Man are dealt with. The classifications of G. de Mortellet and Montelius are adopted for the Palæolithic and Neolithic culture stages respectively. Like the majority of geologists, Mr. Wright considers that the so-called transition stages, the Campignien, the Tardenoisien, and the Asylien, fail to demonstrate anything in the nature of a passage between the Palæolithic and Neolithic industries of Europe.

After reviewing the evidence adduced for the various theories of the Ice Age, the author devotes several chapters to a discussion of late glacial changes of level in Fennoscandia, in the British Isles, and in North America. He advocates strongly the theory of Isostacy, first put forward by Jamieson in 1865, and endeavours to show that the observed phenomena may be accounted for by unchecked isostatic recovery from the effects of the ice-load, combined with a single oscillation of sea-level. His treatment of the question is very ingenious, but he is compelled to admit that the 100 ft. beach of Scotland offers a complication which is not met by the theory.

The changes of climate which accompanied the above changes of level are also discussed, particular attention being paid to evidence yielded by the researches of Swedish botanists. An able summary is given, based on the work of Gunnar Andersson, who holds that, in the northward migration of plants, the arctic element was followed in turn by the birch, the fir, the oak, and the beech, the evidence indicating a fairly steady amelioration of conditions up to what has been called the post-glacial climatic optimum, which coincided in time with the end of the Ancylus period and the beginning of the Littorina period. Subsequently deterioration of climate set in. Mr. Wright considers that it is difficult to cite any clear botanical evidence from this country of this post-glacial climatic optimum. He offers no criticism of the conclusions arrived at by Professor F. J. Lewis as the result of his recent researches on "The Plant Remains in the Scottish Peat mosses."

The volume is a valuable contribution to the literature of glacial geology. The author has succeeded for the most part in making clear

to the reader when he is dealing with fact and when with theory, and his book will be welcomed by geologists as a concise synopsis, from a particular point of view, of important recent work. The illustrations are excellent alike in selection and in execution. Special mention is merited by the admirable photographs by Mr. Lunn of the Geological Survey of Scotland. R. C.

THE COUNTY OF RENFREW.[1]

By C. A. Scott.

(*With Maps and Diagrams.*)

The political unit, the County of Renfrew or Renfrewshire, has evolved by many complex stages to its present extent. The name Renfrew belonged originally to the site of the present county town, and is derived from the Gaelic words Rinn—a point of land, and Frew—a flow of water; thus making Renfrew the point of land near the flow or confluence of the rivers Clyde and Cart. That point of land has indeed been the nucleus of various divisions, with boundaries more or less approximating to the present county boundary. The administration of these regions has been in turn in the hands of King and Nobles, Church and State. The extent of the boundary naturally underwent great changes in passing from ruler to ruler, increasing in times of prosperity and diminishing with the passing power of its administrators. These oscillations were only temporary; the greater force of nature, and the subtle influences of geography upon history and politics, have at length established and maintained the integrity of an area which is essentially a natural region.

The story of the growth of the county belongs to history. At the beginning of a geographical description it is only necessary to indicate that Renfrewshire is a region of natural boundaries more or less, and that the geographical factor has had no small share in the history and development of the county.

Boundaries.—Renfrewshire at the present day extends from latitude 55° 40′ 32″ N. to 55° 58′ N., and from longitude 4° 13′ 24″ W. to 4° 53′ 48″ W. The boundary encloses an area of 240-241 square miles, *i.e.* 154,240 acres, but the area, including foreshore and inland water, is 250 square miles. The county is roughly a parallelogram in shape, having its greatest length diagonally from south-east to north-west, a distance of 31·5 miles, and its greatest breadth from north to south, 13·25 miles.

The great changes that have already been mentioned as taking place in the boundary of the lands that are now Renfrewshire, were all prior to 1402. In that year King Robert the Third separated from Lanarkshire (which formerly extended to the Firth of Clyde) its western division,

[1] Extracted from a thesis presented for the degree of B.Sc. in Geography of Glasgow University, in August 1914.

Map of Renfrewshire.

making it into the separate sheriffdom or shire of Renfrew. The changes that took place before this are of little interest to us, except in one case, which will be mentioned immediately. The shire has been changed very little since it was formed in 1402; and in Blaeu's Atlas of 1654, under the title of Præfectura Renfroana, there is given an area whose boundaries coincide to a remarkable degree with those of the present county of Renfrew.

The Firth of Clyde in the west, and the broader part of the river in the north-west, have always formed a barrier, which as a terminus of local administration man has never disputed with nature. Consequently they form to-day, as from earliest times, the west and north-west boundary of the shire.

The northern boundary of the county is formed by the river Clyde as far east as Yoker. At this point the boundary crosses the river, and takes in a part of the land north of the Clyde. At a first glance it would seem as if it were a breach of geographical principle for a local boundary to cross a broad waterway, but we must come back to the development of the county prior to 1402 to throw light on this subject. The explanation why a part of the county should be found north of the Clyde has been absolutely ignored by the historians of the shire, though it is rooted in history as well as in geography.

It is certain that when the Abbey of Paisley owned and dominated the surrounding lands, to the extent of all Renfrewshire, they also possessed lands north of the Clyde; further, when the king presented the Barony of Renfrew to Walter the High Steward of Scotland, it included territory north of the Clyde. Thus lands north of the Clyde have had a historical connection with Renfrewshire, and though geographical control has broken the connection to a certain extent (for the northern part was once more extensive) at its weakest point, it has been unable to sever the connection completely. Its weakest part is just the part opposite the present boundary break. Here the river was once fordable by pedestrians in the days when it was a stream of rocks and shallows. It was consequently no barrier then, for north and south were one for communication and administration, and geographical control has been justified.

The present boundary turns north of the Clyde at Yoker, following the Yoker Burn northward, turning east to Temple, and south again through Anniesland and along Crow Road to Jordanhill Station, then south-west to the Clyde again at the old Marline Ford. The extent of land north of the Clyde in Renfrewshire is only some 1294 acres.

On crossing to the south side of the river again the boundary strikes west along the channel of the Clyde for a short distance, but on reaching the eastern outskirts of Renfrew it doubles back sharply to the east, running in a south-east direction just south of Craigston. The south-east trend of the boundary is continued past Pollokshaws, and here the most recent changes in the boundary have taken place, for the last mentioned place is now in the county of the city of Glasgow. After continuing south-eastward for a short distance the boundary turns south and is formed by the White Cart river almost to its source. Leaving

that, the boundary is continued to its south-eastern extremity in Laird's Seat. In this eastern part of the county the boundary is more artificial than elsewhere; only in the north is there any sign of geographical influence. The point at which a large river becomes too wide to be bridged is generally the terminus of a local boundary. Lanarkshire therefore ends where the river becomes too wide to be bridged conveniently. Above this point the river banks are embraced by one county. Below it the river forms the boundary between Renfrew and Dumbarton.

The southern boundary is on the whole a more natural one. The southern half of the county is occupied by a broad band of moorland heights, and the boundary approximately cuts in a south-east to north-west direction along the watershed of these heights. From Laird's Seat to Caldwell Station the boundary has a general north-west trend over the high moorland country. At Caldwell it crosses the Loch Libo Gap, turning slightly south-west, but continuing its north-west trend again, skirting south of Rowbank Reservoir, and descending by the Rowbank Burn to the north shore of Kilbirnie Loch. The boundary continues from here in a north-west direction, following practically the watershed of the north-west Renfrewshire heights. This line is continued to a point somewhat south of Loch Thom, where the boundary turns sharply south-west by the Kelly Burn, which carries it to the Firth of Clyde, just at Wemyss Bay Pier.

The boundary just described has undergone very little change since the shire was formed, with the exception of the few alterations made by the Boundary Commissioners for the convenience of county and parish administration, and of the parts just recently taken in by the ever expanding County of the City of Glasgow. As already mentioned, Renfrew is comparatively small in extent, being only twenty-seventh in order of size of the counties of Scotland; but its geographical position and natural resources have made it of no small importance to the geographer. The influence of geography on the development will be traced in the descriptions that follow.

Soil and Minerals.—The soils, which are fundamentally dependent on the rocks, are, in the low-lying parts of the shire, generally of a rich alluvium which is capable of bearing heavy crops. Along the larger valleys also a fertile alluvial loam is found. Over the volcanic rocks the soil is always very thin, the bare rocks protruding frequently, except where sheets of boulder clay occur. The minerals of the shire, though of no great economic value, are of considerable interest, many of the specimens found being unique. In the many quarries in the volcanic rocks, in railway cuttings, and other excavations, these minerals have come to light. Native copper has been found in the Boylestone Quarry (Barrhead). The same metal has also occurred in the form of copper sulphide, and somewhat more extensively at Kaim in Lochwinnoch. Here it was mined for years; in fact in 1861, in eight months 600 tons of dressed ore were shipped from Ardrossan to Swansea. At Hurlet the shale has provided alum, and other less important minerals. Fluorite was found at Kempock Point Quarry, and lead sulphide at Howwood. Near Bishopton a rare yellow crystalline mineral, Greenockite, was

unearthed in a railway cutting. Many of these specimens are to be seen in the Hunterian Museum at Glasgow University.

Surface and Scenery.—The surface and scenery of Renfrewshire are of the lowland type; and though they lack the imposing grandeur of the Highlands, and are even dwarfed by the Southern Uplands, they have beauty and charm of their own. The scenery is not so much impressive as it is calm and restful. The long gentle slopes of the uplands, rising from the green of the valleys to the drab of the heather moors, the waters of the lochs, the little glens and murmuring streams of the hill country, make scenery, which though everywhere on a small scale is everywhere of irresistible charm, and makes Renfrewshire a land where monotony is unknown. Whatever be the subtle influences of scenery upon race, the scenery of the shire has certainly been inspiring, for there is scarcely a stream that goes down from the hills whose murmur has not been turned to song.

In viewing the landscape, from a geographical point of view, we find four well-defined divisions:—

(1) The lowlands in the east and north-east of the shire.
(2) The higher ground or hills stretching from the north-west of the county in a broad belt to the south-east extremity.
(3) The rift-valley gaps cutting the hills in a north-east to south-west direction, and running out like fingers from the lowlands.
(4) The coastal lowlands, or raised beach.

The Lowlands, or laighlands as they are locally termed, consist of a concentrated mass of flat low-lying country on the north-east of the county bordering on the river Clyde. The county is roughly oblong in shape, and if it were to be quartered the north-east quadrant would represent the lowlands approximately both in area and shape.

To define them more exactly, however, they run from the north-east extremity of the county westward along the banks of the Clyde to the neighbourhood of West Ferry, behind which the uplands begin to rise. The low ground stretches inland in a line due south from West Ferry to a little south of Johnstone, behind which the uplands are again visible. The southern boundary of the low country is formed by the northern margin of the hills which stretch from Quarrelson eastward to Busby. The margin of the hills south of Paisley are the Braes of Gleniffer. The lowlands on the east are continued into Lanarkshire.

The land within the area specified is very flat, interrupted only by very minor undulations, which are generally the outlying edges of the volcanic hills. The flatness of the region is demonstrated by the fact that the spires of Paisley can be seen from almost any part of the lowland, and the clock in Singer's works, Clydebank, can be seen from the braes behind Johnstone. Leaving out of account the many towns and villages that are concentred round Paisley, the lowlands are a fertile and well-cultivated area. The north and west of Paisley, in particular, is rural Renfrewshire; here are to be found the great fields of wheat, oats, potatoes, etc., yielding heavy crops from the rich alluvial soil. The lowlands stretch north-west from this district up the beautiful and richly cultivated vale of Gryfe. The lands to the south and east of

Paisley are scarcely less beautiful in parts, though industrial activities, with factories and pit machinery, have disfigured the landscape to some extent. The lowlands are well watered, every stream and river of any note finds its way to the Clyde through the lowlands. Though the ground is flat, the scenery is not monotonous. On the contrary, the view that is opened up to the highlands on the north is very imposing.

Of the part of the shire north of the Clyde the surface is slightly hilly. The undulations which skirt the base of the Kilpatrick range overlap the lower grounds, and, running east towards Glasgow, are formed into a succession of low conical hills, several of which are within the county, the most considerable being Jordanhill, which rises some 180 feet above the river. Between and around these the lands are low, flat, and alluvial, resembling those south of the river.

The High Ground occupies a broad belt of the shire stretching from the extreme south-east to the north-west. The high ground would be a continuous belt of almost uniform breadth from south-east to north-west if it were not cut in two places by gaps of the rift valley type, in a line almost at right angles to the trend of the high ground. In fact, the gaps have the same direction as the midland valley, and are parallel to the boundary faults of that area.

The two gaps, (1) The Loch Libo Gap, (2) Kilbirnie Gap, divide the high ground into three parts, of which the northern is by far the most extensive, being of greater extent than the combined areas of the other two. In fact the gaps are separated only by a narrow strip of upland moor of no great height. The northern division of the uplands, which is defined by the Kilbirnie Gap on the south and the coastal raised beach on the north, is dissected by the Gryfe valley, which penetrates its eastern flank, and also in the north-east by a part of the coastal strip running into it in a north-east direction; and but for a narrow neck of high ground this would form a third gap, isolating a small part of high ground in the extreme north-west of the county.

The high ground rises from sea-level to over 1000 feet in parts, 1246 in Hyndal Hill, 1446 in Creuch Hill, and 1600 in Misty Law, the highest peak in the shire. The slopes are nowhere very steep, but rise in long gentle step-like slopes, not into peaks and crags, but rather to flat-topped summits of considerable extent, while here and there on the summits a hill rises still higher, which gives from the low ground the appearance of being an isolated summit. The tops of the hills have a plateau-like appearance, with great extent of moorland covered with coarse vegetation, in parts peat bogs, while here and there rocks are thrust through the surface. Over these moors one can walk for a considerable extent with nothing but the freshness of the air to indicate the elevation. In the hollows nothing of the surrounding low country can be seen; but on ascending one of the summits rising out of the plateau-like heights a magnificent view is presented.

From the summit of Misty Law a view can be obtained that far surpasses much of the Highland mountain scenery. To the south-east one can gaze across the Kilbirnie Gap to the heights beyond. The gap can be seen opening out to the lowlands of Ayrshire on the south. On

the east the valley of Gryfe is visible running down into a sea of lowland country that merges dim in the smoky mist of Glasgow. To the west the unmistakable crags of Arran rise out from the glittering waters of the Firth, while northward two distinct geological types of scenery are presented at one gaze. The lowland hills are spread in front, gentle, undulating curves, backed by the towering and majestic peaks, the vanguard of the Grampians. The scenery is further diversified by the innumerable lakelets and reservoirs that feed the streams and burns visible on all sides. The lowlands, gaps, and valleys, are painted with the verdure of agriculture and studded with towns and villages, picturesque in their symbols of life and human activity, while around in the immediate foreground is the desolate drab of the moorlands, where Nature has made a fitting home only for the fox and the wild fowl.

The other two divisions of the uplands in the south-east are very similar in surface and scenery, though scarcely of so great an elevation. Here also the desolation of the moorland is neither so complete nor extensive. Farms are more common, and though the hardier crops only are grown and rough pasture abounds, still the prospect is better. The small lakes and reservoirs on the moors are bewildering in number, but these too have their place in the economics of the shire.

The Gaps.—The Kilbirnie Gap, by far the broader and deeper of the two, is characteristic of its type. The floor is occupied by two long narrow lochs which were formerly connected by a third loch which has been drained. The ground is well cultivated and wooded in the upper slopes. The Loch Libo Gap, which runs parallel to the other from Barrhead to Caldwell, is much narrower. The sides are steeper and not so well cultivated, but behind Loch Libo the slope is well wooded right down to the water's edge. The raised beach round the coast is more a consideration of economics. It is backed by the old sea cliffs for a good part of the way from Langbank to Greenock. This region is the scene of the great maritime activity of Renfrewshire.

Agriculture: Its History and Development.—The history of the development of a county or country, besides depending to a large extent on the natural endowments of soil, relief, climate, etc., is often bound up with the history of the development of the people and the administration and government of the land. This is peculiarly the case in Renfrewshire, where we can trace the development of agriculture to historical events. It would seem from various historical descriptions that agriculture throughout Scotland advanced and declined alternately within certain limits during periods which would doubtless correspond to epochs of peace and prosperity, and war and discontent.

Of the agricultural methods of the very earliest inhabitants of Renfrewshire, the Iberians, we know only that they were familiar with cereals and possessed domesticated animals. They were regarded as the founders of modern European civilisation, and whether, if left in peace to practise the arts of peace, they would have made rapid development, it is difficult to say. But the wave of migration that swept westward across Europe, beginning as far back as the ninth century B.C., finally settled that question. The Celts, Goidels, and Britons, are the next inhabitants of

our shire, with the exception of a tribe in the east of Mearns called the Mæatæ. These are represented as a tribe living in utter savagery without agriculture.

It is probable that with the coming of the Romans the district now called Renfrewshire was in a state of undeveloped barbarity. Whether Renfrewshire gained very much materially from the great advantages in agriculture that undoubtedly came to other parts of Britain with the coming of the Romans, it is difficult to say. The shire must have been on the very outposts of Empire, and perhaps the garrison at Paisley had enough to do to hold in check the fierce tribes of the north, and could ill afford time to practise or instruct in agricultural matters.

For a long period after the withdrawal of the Romans, history is a blank, and consequently no information can be obtained of the state of development of the county. It was not until the reign of Alexander I. and the advent of feudalism that we can learn anything trustworthy. The responsibility and obligations that were part of the system did much for the development of the land. Almost the whole of the lands of Renfrewshire were granted by David I. to Walter Fitz Alan, an English knight, who had rendered some valuable service to the Scottish king during his expedition in England in the twelfth century.[1] After the rout of Winchester in 1141 Walter Fitz Alan came north with David and received the lands as before mentioned as a reward for his services.

As he was now responsible for the peace and good government of his estates, Walter Fitz Alan soon established castles and lodges to overawe the land. These he gave to his companions and friends, who were again responsible for certain areas. At this time Renfrewshire was almost entirely waste and forest, but as castles were built and strongholds established, the land soon began to be developed and cultivated, and to supply food and other necessities to the garrisons and lords of the castle. Of far greater importance, however, was the next step that Walter Fitz Alan took for the welfare of his domains. He founded a monastery on the banks of the river Cart at Paisley; and as the Church at this time was the custodian of all the arts and crafts, the monastery was as a beacon in the intellectual darkness around. The monks were zealous men, anxious to promote the material as well as the spiritual welfare of their people. Learned in the lore of the soil, they encouraged agriculture and led the way in trade and craft. It is also important to note that the monks of Paisley were of the order of Cluny and came from Shropshire, the original home of their benefactor, Walter Fitz Alan. The Cluniacs, it is noted in history, were reputed to be among the best agriculturalists in Europe, consequently the coming of the monks to Renfrewshire meant the introduction of the most improved methods of farming then known, and must have given a great impetus to the development of agriculture throughout the whole district. The sphere of influence of the monastery soon stretched far beyond Paisley. The many gifts of land that were given to the Church by the nobles of the country soon made the monks the landlords of estates

[1] See *History of the County of Renfrew*, by Dr. Metcalfe.

that stretched far beyond the present boundaries of Renfrewshire. The systematic records that were kept in the monasteries give us some very interesting contemporary facts. From the Rental Book, carefully kept from 1460 to the Reformation, we gather that wheat, oats, barley, and flax were the crops raised ; and rents of kind were also paid with stirks, calves, wedders, poults, capons, geese and cheese. Thus from the middle of the twelfth century to the middle of the sixteenth, agriculture must have been carried on with a fair degree of success. The Abbey itself and its own home farms must have been kept and cultivated in a manner that would be an example to all around. In Hamilton's *Description* of 1831, he says "The abbey and church, with all its fair gardens and orchards, and a little park for fallow deer, are enclosed within one of the fairest walls, not in the kingdom only, but in all Europe."

The lowlands also of the shire were in the hands of the monks. They had a granary at Blackston (near Linwood), and their industries are also manifest in mills and other works that they constructed on the rivers of the neighbourhood. In fact this impetus must have put Renfrewshire ahead of other parts of the country in agricultural development, if contemporary accounts of Scotland are trustworthy. It is at least certain that one hundred years after the colonisation by Walter Fitz Alan, the land, formerly waste and forest, had been extensively reclaimed, the population had increased, and the little village of Paisley-on-Cart had grown into a thriving town. Everywhere through the Abbey-lands there were signs of prosperity which can only come from an organised and systematic cultivation of the soil. There is no cry of poverty in the records of the monks; and only once in 1588 is there mention of famine which raged over all the country at the same time, accompanied by pestilence and leprosy. The absence of frequent outbreaks of famine, which were elsewhere common, indicates that there was always a sufficient supply of food, which is again an indication of agricultural success.

During the next century, the period of the Reformation, a long succession of wars at home and abroad devastated the country, and put a fatal check on progress. The land was drained of its labour, and no security or protection was left to encourage farming. In 1696 we have another record, scarcely less pitiable as a tale of devastation and misery. From that year there followed in succession seven seasons of exceptionally foul weather. The crops were blighted by mists and sunless drenching summers, by storms, and by early bitter frosts and deep snows in autumn. The corn rarely ripened, and the green withered grain was often being shorn in December amidst pouring rain. Even in January and February many starving people were trying to reap the remains of their ruined crops of oats. The sheep and oxen died in thousands, and prices of everything went up to famine pitch.

Famine is again mentioned in historical records in 1709, 1740, and 1760, bringing ruin to farmers and starvation to the people. Improvement was impossible in such a time when no capital could be spared to

buy seeds or implements, or to experiment with anything that promised improvement.

After 1760, however, things began to improve. The effect of all this devastation on the minds of those who had their prosperity bound up in the soil cannot be doubted. Both proprietor and tenant were roused to new activities, and began to see that only a studied co-operation with nature could ward off these disasters so ruinous to the land. Land began to be enclosed which had hitherto been open for cattle to wander across and destroy. By 1782 most of the good land in the shire was enclosed with dykes or hedges. The interest of the landlord also led to better methods of leasing and renting, which gave more encouragement to improvement. Intelligent methods of farming were adopted. Attention was paid to the use of artificial grasses, rotation of crops, draining and manuring. The greatest impetus of all was given by the introduction of root-crops, potatoes, turnips, etc., which fed both people and cattle, and made the possibility of famine ever more distant. In Crawford's history, writing about the year 1799, he adds the following note on the general improvement:—"Every gentleman's seat, and even many of the farms and hamlets, stood now encircled with plantation. Even many of the hill sides and hill tops, originally bleak and barren, are now waving with forest trees. The very climate has hence become improved and rendered more profitable to the fruits of the earth."

The improvement at this time was general throughout all Scotland, but nowhere was there more progress than in Renfrewshire. In Wilson's *General View of the Agriculture of Renfrewshire* (1811), he says of the shire: "Its progress in agriculture has of late been so considerable as to render it even on that account an object of importance." Thus it would seem that the shire has been twice at least in the van of agricultural progress.

In Wilson's account we are told some interesting facts which show that landlords had at heart the best interests of the land. Strict rules were prescribed when letting; rotation of crops must be observed, and tenants were bound to manure their farms to a certain amount. Lime was extensively used for manuring, as much as was valued at £1200 being applied annually in Renfrewshire.

At the time of writing we are told that the land was well enclosed with dykes and hedges. The number of farms was on the decrease, showing that small farms were being united. The crops raised were oats, barley, wheat, beans and peas. The cultivation of wheat had, in 1811, recently increased, while peas and beans had decreased. Few turnips were sown. Potatoes introduced in 1750 were gaining ground. Flax was sown in small quantities at Lochwinnoch and Kilbarchan. In good ground oats yielded from 8-10 bolls per acre; barley 6-8; wheat 8-12; potatoes 45-50. In a great part of the shire dairy farming was carried on. Few farms were stocked with sheep, and little attention was paid to the proper breeding of them. In 1810 a number of merino sheep were introduced. Great attention was paid to draught horses. Oxen were used chiefly for the plough and cart.

Progress is still the watchword in agricultural matters, and to-day

Renfrewshire is still an agricultural county of some note. Three-fifths of the shire are under cultivation, and in proportion to its size it is one of the greatest dairy farming shires in Scotland, and had 170 cattle per thousand acres in 1912, as compared with 160 in 1910. This fact is explained by the climate of the shire, which is typical of the north-west margin of Britain, *i.e.*, moist and equable. There is consequently an abundance of rich grass. The decomposition of the volcanic rocks produces a loam which nourishes a rich sweet pasture.

The majority of the cattle are Ayrshires, which are the best milk-producing cows. The shire competes favourably with the neighbouring

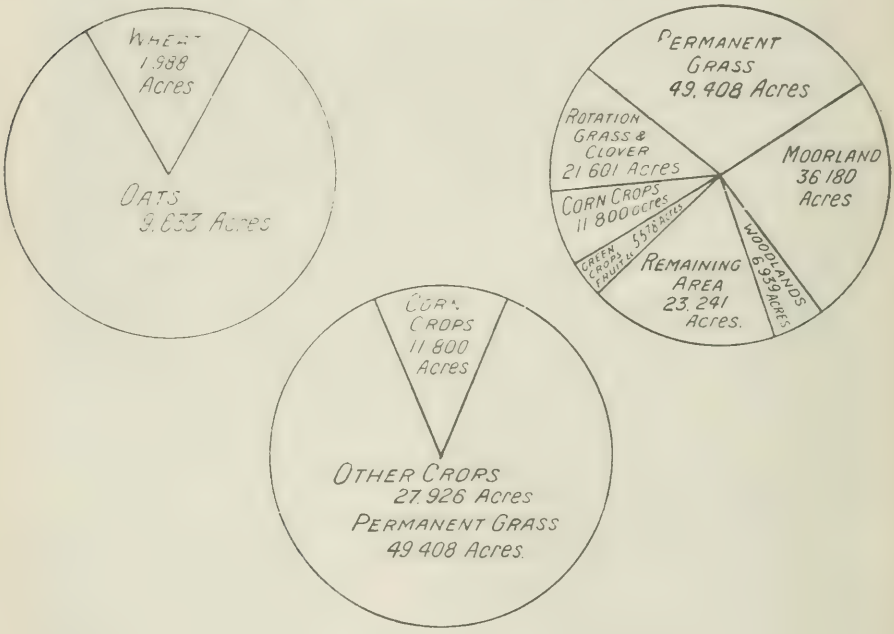

Fig. 1.—Agricultural crops in Renfrewshire.

counties in supplying the markets of Glasgow. In the matter of horses Renfrewshire is ahead of the neighbouring counties. In 1912 there were 22 horses per thousand acres, compared with 16 in Lanarkshire and 13 in Ayrshire. Sheep-rearing is of no special importance, and there has been a slight decrease in the number of sheep since 1910. In 1912 there were 41,872, or 279 to every thousand acres. The number of pigs in the shire has increased considerably since 1910, when there were 1358. The figure for 1912 is 1998. Some new piggeries have recently been established on a large scale in Lochwinnoch parish and elsewhere.

The distribution of crops can best be shown in a graphic manner (see Fig. 1).

In the matter of yield the returns for 1913 are quite satisfactory, as seen from the following table :—

Total produce in quarters.	Acres (1913).	Yield (1913) per acre.	Average yield 1902-1911.
	WHEAT.		
10,741	1939	44·31	40·22
	OATS.		
56,736	9649	47·04	42·62

The agricultural returns for 1913 show conclusively that the cultivation of the soil, and the activities of the farm, are not being allowed to lapse, or to be crushed out by industrial pursuits.

(*To be continued.*)

RUSSIA OF THE RUSSIANS.[1]

AFTER a concise history of the growth of Russia, the author describes its Bureaucracy and Constitution, remarking, "During the last few years Russia has been absorbed in a struggle between Bureaucracy and Constitutionalism." While the proclamation of the Constitutional Manifesto in 1905 marked the beginning of a new era for Russia, the progress of Reform was immensely complicated by the fact that Russia is an Empire of 160 millions, and by the circumstance that, in the vast sweep of the Russian Constitutional movement, a hundred new connotations and implications have been acquired. Dr. Williams describes with graphic force the terrible scenes witnessed, from 22nd January 1905 onwards, before the Tsar on 30th October of that year granted a Constitution and next May met the first Duma of 442 members elected from all parts of the Empire except Central Asia. This Duma lasted only seventy-two days and possessed "no moderating element on either side." The second Duma proved to be as uncompromising as the first, and far less capable. The third Duma lasted for the full term of five years; and the fourth, which assembled in October 1912, "is carrying on a passive policy of marking time and waiting for things to turn up." The author gives a minute description of the Duma and its parties of the Right, Nationalists, Octobrists, Cadets, Progressists, and Social Democrats. He also describes the Council of the Empire, which he considers a much more interesting institution than the Duma, as there "is no better place for studying the psychology of the Bureaucracy and the lingering Byzantine conceptions

[1] *Russia of the Russians.* By H. W. Williams, Ph.D. London: Sir Isaac Pitman and Sons, Ltd., 1914. *Price 6s. net.*

of authority." While the name of the Premier Stolypin (assassinated 1911) is famous in the annals of the Duma, Count Witte and the present Premier Kokovstev are celebrated names in the Council of the Empire.

With regard to the Press of Russia, Dr. Williams tells us that "it is not free," although freer than it was some years ago. "The total of fines imposed on the Press in 1912 was 100,000 roubles (£10,000)." The most widely circulated paper in Russia is the *Russkoe Slove*, a non-party Moscow organ founded in 1900. The best known of the Petrograd papers is the opportunist *Noroe Vremia* (New Time), founded in 1877 by Alexis Suvorin. The oldest and most authoritative of the Liberal papers is the Moscow *Russkia Viedomosti* (Russian News), founded fifty years ago, and edited by Professors of the Moscow University. The organ of the Constitutional Democrats is the *Riech*, of Petrograd, founded in 1906. The non-party *Bourse Gazette* is also published in Petrograd. Since 1906 the Government has published an official daily called the *Rossia*. The party of the Right has several organs remarkable for their virulence of language, the most prominent being the *Russkoe Znamia* (Russian Banner), which inveighs against Jews, Liberals, Octobrists, Poles, Young Turks, and Englishmen. As Russians are witty and have a strong sense of humour, comic papers ought to flourish, but few dare to appear. Monthly magazines, however, are plentiful, the oldest being the *Viestnik Yevropy* (Messenger of Europe) founded forty-eight years ago, to which Turgeniev, the novelist, and Soloviev, author of the standard *History of Russia*, contributed. The *Russkaia Mysl* (Russian Thought), founded thirty-three years ago, and the *Russkoe Bogatstvo* (Russian Wealth), founded in 1876, are also important monthly organs.

The author subjects the celebrated "Intelligentsia" to a masterly analysis, observing that there is nothing altogether like this class in other countries. It was not merely a highly educated class, but "everything they did was permeated with the desire for liberation, for reform." Neither Tolstoy nor Turgeniev belonged to it. "One of the remarkable features of the Intelligentsia was the number of strong and able women it brought to the front." The Revolution of 1905 has, however, greatly changed the Intelligentsia, which has lost its exclusiveness and is no longer a class apart. Faith in many of its dogmas has been shaken, and political parties have largely taken its place. But it cannot wholly disappear, after its century of lofty and disinterested thinking, and while the traditions of its loyalty to great ideas of struggle and sacrifice are still fresh and vivid.

Valuable chapters on Church and People, Literature, Music, the Theatre, Painting, Architecture, Peasants and Proprietors, Trade and Industry, and Petrograd, complete a work of sterling merit which has well been described as the best book on Russia of recent times.

R. R.

PROCEEDINGS OF THE ROYAL SCOTTISH GEOGRAPHICAL SOCIETY.

At a meeting of Council held on the 22nd of March, William G. Black, LL.D., Glasgow, and John Hume, Edinburgh, were elected ordinary members of the Society.

The following were elected teacher associate members:—Peter Whyte, M.A., B.Sc., and James G. Glen, M.A., Edinburgh.

The late Professor James Geikie.

The following minute relating to the late Professor James Geikie was unanimously adopted, and the Secretary was instructed to send a copy to Mrs. Geikie:—

"The Council of the Royal Scottish Geographical Society wish to place on record their deep sense of the great loss which the Society has sustained by the death of Emeritus Professor Geikie. He was one of the indispensable factors in the founding of the Society, and when Dr. Bartholomew had the promise of his cordial support it was felt that success was assured. It was he who, at the meeting which took place in the hall of the Edinburgh Chamber of Commerce in 1884, proposed the resolution 'that this meeting, recognising the scientific and general utility of a national Society for the promotion of geography, resolves that a Geographical Society for Scotland be now formed.' In various capacities he worked to secure its success with rare devotion. He was one of the first vice-presidents, and held this office till his death, except during his tenure of the presidential chair from 1904-10.

"He acted as honorary editor of the Society's *Magazine* since 1888 with singular tact and keen sympathy with the successive editors who worked with him. He published articles of great scientific value, which contributed in no small measure to the success of the *Magazine*.

"It is unnecessary to refer here at length to those researches and publications which secured for him a world-wide reputation as one of the great leaders of his time in geology. But the Council desire to add that they remember with gratitude the keen interest which he took from the beginning of his professorial career in the furtherance of geographical teaching in the university, and the active support which he gave to the establishment of the lectureship on the subject in 1908.

"Those who had the privilege of being closely associated with him in the work of the Society will ever remember his enthusiasm for objects that were dear to him, his genial disposition, and his kindness of heart. They mourn his loss as that of one for whom they had the most sincere and affectionate regard.

"The Council have to express their deepest sympathy with the widow and family of the late Professor Geikie."

Honorary Editor of the "Scottish Geographical Magazine."

Dr. John Horne, F.R.S., was unanimously elected honorary editor in succession to the late Professor James Geikie.

JAMES GEIKIE, LL.D., D.C.L., F.R.S.

1839–1915.

An Appreciation.

(With Portrait.)

Among the losses which the Royal Scottish Geographical Society has sustained, during the last thirty years, there is none more memorable than that caused by the death of James Geikie. His unwearied devotion to its interests was one of the prominent features of his life. He confessed that he worked for it more strenuously than for any other scientific society with which he was connected. His distinguished career and the commanding position which he attained in glacial geology shed lustre on the various offices which he adorned. It is a fitting tribute to his memory to record, however briefly, the value of his services to science and to this Society, whose success was a never-failing source of delight to him.

A native of Edinburgh, inspired from his boyhood by its physical features and stony records, he joined the Geological Survey in 1861, at the age of twenty-two. His earliest years on the staff were spent in mapping the deposits of boulder-clay, sand, gravel, and peat in those areas where only the solid geology had been shown on the maps. Thus at an early stage in his career he was led to study the distribution, the characteristic features, and the history of these accumulations, to which insufficient attention had been paid in the past.

Thereafter he proceeded to new fields where both the solid rocks and the drift occupied his thoughts. During his connection with the survey it fell to his lot to map large areas of the Scottish coalfields, portions of the older Palæozoic rocks of the Southern Uplands and the Cheviots, together with tracts of Old Red Sandstone and metamorphic rocks in the counties of Perth and Forfar. As a field geologist he was specially interested in the structural relations of the rocks, the evolution of land forms, and the glacial and post-glacial deposits which are so typically developed in Scotland. In each of these departments he made important contributions to science. His power as an original thinker and investigator is, however, shown at its best in Pleistocene geology, which became his own special sphere.

It is difficult for the younger generation to realise the effect produced by the publication in 1874 of his epoch-making volume *The Great Ice Age*. Its chief aim was to indicate the climatic changes that characterised the Glacial Epoch in every glaciated region which had been studied by geologists. In his opinion, such an investigation formed the basis for determining the age of those deposits which contained the earliest traces of man in Britain. At that time some leading authorities contended that the latter were post-glacial. James Geikie maintained that the Palæolithic gravels were not post-glacial but mainly inter-glacial, and that the commingling of arctic, temperate, and southern forms pointed to oscillations of climate. He boldly sketched the climatic conditions

indicated by these mammalian remains and the geographical changes of Palæolithic time. He further reviewed the evidence furnished by foreign countries, from which he inferred that the Old Stone-men and the southern mammalia were not post-glacial.

These views were advanced in a lucid and attractive form, supported by cogent arguments, which immediately arrested the attention of geologists at home and abroad. His volume on *Prehistoric Europe*, published in 1881, dealt in greater detail with the cave and river accumulations which had yielded traces of man and Pleistocene mammals. Again he enforced his main contention that Palæolithic man must date back to inter-glacial, if not in part to pre-glacial time.

In his final volume, on the *Antiquity of Man in Europe*, published in 1914, which may be regarded as a further extension of his researches in Pleistocene geology, he correlated his inter-glacial periods with the culture stages of Palæolithic and Neolithic man.

In 1882 he was appointed to succeed his brother, Sir Archibald Geikie, as Murchison Professor of Geology and Mineralogy in Edinburgh University. At the time he hesitated about severing his connection with the Geological Survey, as the problems presented in the field had always an intense fascination for him. But ultimately he decided to spend the rest of his life in teaching the science which he had done so much to promote. It was a wise resolution. For his enthusiasm for research, his power of lucid exposition, his sympathy with younger men, and his tact, ensured his success within the walls of his own university. One could foresee that the onward march of Pleistocene geology would make increasing demands on his time, in order to keep abreast of the voluminous literature relating to it. He would be more likely to find leisure to overtake this work in the academic circle than in his old sphere, where the application of zonal methods to stratigraphy and the use of the microscope in the study of rocks were leading to infinite detail.

The mills of the Scottish universities grind surely but slowly. Years elapsed before he obtained the necessary equipment for his department at which he aimed. But on his retirement, in 1914, he vacated a chair whose reputation was enhanced by his own researches, with lectureships in petrology and palæontology, a museum collection for teaching purposes, and a geological library of several thousand volumes. A signal tribute to his success in the university was paid to him in 1894, when his colleagues elected him the first Dean in the Faculty of Science established by the Royal Commission—a position which he held for nineteen years.

The change in James Geikie's sphere of labour in 1882 was fortunate for the Royal Scottish Geographical Society. At that time he deplored the methods of teaching geography in Scottish schools, the wretched school maps, the dry handbooks, the apathy of educational authorities. He contrasted the indifference of the home-land with the thoroughness of German methods. In that country the subject was regarded as of prime importance. Chairs and lectureships were instituted in the universities and technical colleges, so that the young generation might

have proper training in this branch of science, and be prepared for future developments.

When Dr. Bartholomew—then a student in geology—suggested to him in 1884 that a Scottish Geographical Society should be instituted, he cordially approved of the proposal, for he hoped that it might be useful in realising some of his aims. At the original meeting, which took place in the hall of the Chamber of Commerce, it was he who proposed the resolution "that this meeting, recognising the scientific and general utility of a national society for the promotion of geography, resolves that a geographical society for Scotland be now formed." He was one of the first vice-presidents, and he held this office till his death, except during his occupancy of the presidential chair, from 1904 to 1910. From 1888 onwards he was honorary editor of the Society's *Magazine*. At intervals he contributed articles of great scientific value to the *Magazine*, relating partly to Pleistocene geology, and partly to the evolution of the surface features of the globe. In various capacities he strove to make the Society helpful in raising the people to a proper sense of the value of geographical education.

During his academic career he devoted considerable time to problems on the borderland of geology and geography. In this field of research he recognised the force and originality of the contributions of Professor Suess of Vienna in his monumental work, *Das Antlitz der Erde*. In his address to the geographical section of the British Association (1892), he dealt with the origin of coastlines in relation to crustal movements. Under the influence of Suess he advanced the heretical suggestion that we might be compelled to modify the view that all oscillations of the sea-level are due to movements of the lithosphere alone. His field training enabled him quickly to appreciate the modern interpretation of the structure of the Alps, led by Suess, Bertrand, Schardt, Lugeon, and Steinman. His account of their researches is clearly set forth in his article on "The Architecture and Origin of the Alps," published in the Society's *Magazine* in 1911. The last statement of his views on the evolution of land forms is embodied in his volume on *Mountains, their Origin, Growth, and Decay* (1913), which was dedicated to his old friends and colleagues on the Council of the Royal Scottish Geographical Society. In recognition of his scientific researches and of his devoted service he was awarded the gold medal of the Society, and was presented with his portrait on his retirement from the presidential chair.

This sketch of his career would be incomplete without reference to his strong personality, his genial disposition, his rich vein of humour, and his literary gifts. He had favourite authors whose works gave him infinite pleasure, among whom were numbered Shakespeare, Heine, and Burns. He revelled in their humorous creations. In middle life he translated *Songs and Lyrics* by Heinrich Heine. His fund of stories was endless, and they were told with inimitable humour. This rare combination of fine qualities made him a delightful companion in the field and in social circles.

JOHN HORNE.

It would not be fitting that a notice of Professor Geikie's lifework should appear in this *Magazine* without some special reference to his labours as Honorary Editor. For no other of the many offices which he held during his long life was he perhaps better fitted, for in none could his qualities of tact, sober judgment, and generous consideration for others be more useful. During his tenure of office he was associated with four successive Acting Editors, and in every case he permitted his colleagues to develop their individuality, while taking care that there was no resultant loss of continuity in the conduct of the *Magazine*. There is perhaps no greater proof of strength of character than this willingness to allow intellectual freedom to others, and there can be no quality more calculated to endear a man to those who work under him. In Professor Geikie's case this wide tolerance of individual effort was combined with a scrupulous loyalty; he accepted without hesitation responsibility for experiments which he had not initiated, and would fight another's battles with the same enthusiasm with which he always faced his own. It was these qualities, which remained unknown except to those who were closely associated with him, which earned for him the affectionate admiration of so many workers.

While, in accordance with his settled policy, he left the conduct of the *Magazine* in the hands of the Acting Editor, nevertheless all matter was submitted to him before publication, and he contrived, without any parade of interference, to exert a steady influence upon the nature of the contents. In the case of special difficulties, he was always ready to put his time and knowledge at the disposal of the editor and publication committee, and the debt of the *Magazine* to his prudence and care is incalculable. In the preceding article mention has been made of his own personal contributions, which were many and valuable, and have done much to give the *Magazine* the reputation it possesses, but, in addition, he gave to it and its interests an amount of unacknowledged time and trouble for which the Society owes him a heavy load of gratitude.

Ed. *S.G.M.*

GEOGRAPHICAL NOTES.

Europe.

Rice Cultivation in Europe.—A note in *Nature* gives a short abstract of an article in the *Agricultural Journal of India* on rice in Spain. Most of the rice land of Spain is situated in the province of Valencia, and the cereal was introduced here at the time of the Moorish conquest. Although the total production of rice in Spain is the lowest in the six important rice-growing countries, yet the yield per acre is double that obtained in Italy and Egypt, and more than six times the official figures for India. This result is due to the thorough cultivation of the fields, the system of transplantation practised, and the use of large quantities of manures. Hitherto the fear of encouraging malaria has acted as a deterrent to the extension of the area under rice in Europe, but at the recent International Rice Congress at Valencia the view was put forward

that this prejudice is unfounded, provided certain precautions are adopted. If this view is widely accepted it may mean a large increase in the area under rice in Europe.

Another article on the same subject appears in the *Revue Générale des Sciences* for 15th January, and is illustrated by some striking photographs of the Spanish rice-fields, which illustrate clearly the very laborious methods employed in that country. The author, Prof. Henri Jumelle, gives details of the rice-fields of Italy, Spain, Portugal, and Greece, and notes that on a small scale the plant is also cultivated in France, in the Camargue. Here rice is grown in relatively small plots, varying in size from ten to about thirty-five acres, and the total acreage varies enormously from year to year. The reason is that rice-growing is but a part of schemes for land reclamation here. Salt lands are reclaimed for ordinary agriculture by a process of flooding, and as rice is the only crop which will grow on flooded areas, it is sown as a catch crop, in order to cover the expense of the flooding. After one crop the land is put down to grain or lucerne, or even planted with vines. Only if the salt shows a tendency to reappear in harmful amount is the flooding and rice-growing repeated. In Italy rice forms part of a system of rotation of crops, a not infrequent procedure being rice for three or four years, then a crop of wheat, and then one or two years of pasture. In Spain, on the other hand, where the rice belt occupies the littoral, the fields are permanent. The articles are of interest as indicating that rice in Europe is a more important crop than is generally realised.

The Economic Position of Germany.—Professor W. J. Ashley's lecture on the above subject has aroused so much general interest that our readers may be glad to know that it is reported in full in the *Journal* of the Royal Society of Arts for February 26, 1915. The general lines of the paper have already been indicated by articles in the public press. The greater part of the lecture was taken up with the food problem in Germany, and Professor Ashley emphasises especially certain points connected with this which are liable to be overlooked. Thus he notices that the question of human food cannot be considered apart from that of fodder for animals; further, he expresses some doubt as to the extent to which the official agricultural statistics of Germany can be relied upon; finally, an important point is the fact that Germany is very largely dependent upon alien labour for the gathering in of her harvest, and as such labour will probably not be available during the coming summer the harvest will doubtless suffer in consequence.

The question of German industries is treated much more briefly, but his survey leads the author to believe that if the Allies continue to command the seas, unemployment, with consequent pauperism and distress, will probably grow to alarming proportions in Germany.

Asia.

Dr. F. de Filippi's Asiatic Expedition.—In the *Geographical Journal* for March there appears a report on the work of this expedition,

which includes a general summing up of the results. Most of the facts contained in this report have already been summarised here. We note as an additional point of some interest that a considerable part of the scientific equipment of the expedition was left behind at Tashkent, owing to the difficulties of communication due to the war; all records and exposed photographic plates have, however, been brought home. The party have been successful in carrying out the whole of their programme in sixteen months and a half.

Exploration of Siberian Coast.—Commander Vilkitski, the discoverer last year of new land to the north of Siberia (cf. vol. xxx. p. 87), has been again voyaging in the same region this year. He left Vladivostok in July last, and has been able to make some additional observations in the regions surveyed last year, but has found the ice conditions very heavy. According to information received by the Ministry of Marine at Petrograd, Commander Vilkitski finds that Nicholas II. Land (cf. vol. xxx. p. 88), extends to lat. 77° 50′, long. 90°. The expedition also discovered an island near Bennett Island, in lat. 76° 10′, long. 153°, apparently the same size as Bennett Island (see map referred to above). Commander Vilkitski is now laid up in Taimyr Bay, and is by no means certain that he will be able to get his ships out during the coming summer. He has been in wireless communication with Captain Sverdrup, who is also laid up on the same coast, and proposes to send some of his men to the latter in order to relieve the pressure upon his own supplies.

Africa.

German East Africa.—A series of articles on the German Colonies are now in course of appearance in the *Bulletin* of the Imperial Institute, and that which is to be found in vol. xii. 4, is devoted to certain aspects of German East Africa. The article, which is illustrated by a map, contains a general description of the geography of the region and also of the climate, geology, and mineral resources. The metamorphic rocks of the central plateau are interpenetrated by intrusive igneous rocks with which are associated a number of minerals of economic importance. Among these are mica, gold, garnet, coal, iron ore, and uranium minerals, while copal or fossil resin is dug up on the coastal plain, salt is obtained by the natives both along the coast and also from the evaporation of saline springs in the Ujiji district near Tanganyika, and trona, or hydrated acid sodium carbonate, is obtained from Lake Natron, near the northern boundary of the Protectorate. A number of other valuable minerals are known to occur, but have not hitherto been found in sufficient amount to be worth working. Among these are diamond (one only found), graphite, beryl, etc.

Australasia.

Scientific Handbook of New Zealand.—In connection with the proposed visit of members of the British Association to New Zealand

last summer, a "Guide to Excursions" was to have been drawn up, with a map and an itinerary. When the organised excursions were cancelled owing to the outbreak of the war, it was decided to issue the notes in a modified form, and they have reached us as a small pamphlet entitled *Handbook for Scientific Visitors*, published at Wellington. The pamphlet consists of a series of short articles by various New Zealand investigators on different aspects of the region, the plants being given a very full share of attention. It should prove useful to visitors generally, and some of the descriptions, *e.g.* that of the Kauri forests, are vivid and attractive.

General.

Round-headed Man in Europe.—Professor Arthur Keith devoted his presidential address to the Royal Anthropological Institute in January last to the subject of the Bronze-Age Invaders in Britain, and included in it some general discussion of brachycephalic man in Europe. The address is reported in full in *Nature* of February 11, and we note in it the following more general points.

Britain was invaded in about 2000 B.C. by a race of men who had round heads, and buried their dead in round barrows, but who have left but little trace in the general population at the present time. These invaders have been generally regarded as identical with the Alpine round-heads of central Europe, but Professor Keith points out certain differences. Thus the Bronze Age men were tall and muscular; they had long faces, rugged features, prominent noses, overhanging brow ridges, and were probably fair in hair and complexion. Alpine man, as represented in the Europe of to-day by the Savoyard or Bavarian, is usually short, with dark hair and skin, the face is short and wide, the forehead wide and full and without heavy ridges, the features regularly modelled. Professor Keith does not discuss the relation of the two types, but seems to be of opinion that both originated within central Europe.

As already mentioned, the Bronze Age strain has left little trace in the general population of Britain, but Professor Keith mentions Charles Darwin, Oliver Goldsmith, King Robert the Bruce, and also "John Bull" of *Punch* as being of the Bronze Age type of head form. Among British artisans this head type is rare, but in a West End Club the percentage of round-heads was found to be as high as 20 per cent. In Europe generally, however, there seems to have been a tendency through historical time for the round-heads to displace the long-heads; even in Italy, for example, while the Mediterranean long-heads predominate in the south, the North Italians are markedly round-headed. Similarly, while the ancient Greeks were originally long-headed men of the Mediterranean type, a wave of round-heads had penetrated the peninsula before their civilisation reached its zenith, and the present Greeks, like the inhabitants of the Balkan peninsula generally, are for the most part round-headed. To this rule of the increasing predominance of the round-heads the western sea-board of Europe seems to form an exception. Britain, for example, has, as stated, kept its original head form even

through a round-headed invasion. Hitherto sea power has been an attribute of the long-heads, and "what the long-head has lost in Europe he has gained in countries which lie beyond the seas, in virtue of this command of the sea."

War Exhibition in Edinburgh.—A Historical and Geographical War Exhibition has lately been on view in the Outlook Tower, Edinburgh. Sketch-maps of Europe bearing on the geographical distribution of the great wars, and historical maps of war areas in the Low Countries were shown; also sixteenth and seventeenth century plans of many of the cities now involved. Maps and charts showing the growth of Prussia led up to a study of Germany and of the present war, which was shown in its world-distribution, as waged in the colonies, and in its eastern and western European campaigns, in past and current phases: also as war by water and by air. Its effect on art was shown by studies of Edinburgh under war conditions by a local artist, and by an exhibit of the war in cartoon. A collection of the literature of war and peace was available for reference.

This Exhibition will be reopened during the first week of April in connection with a Conference on Regional Survey to be held in the Outlook Tower, April 2 to 5. The main thesis for discussion will be the bearing of education upon the possibility of a state of war or peace in the future. Particulars may be had from Miss Barker, Outlook Tower.

Commercial Geography.

Trinidad and Tobago.—The *Annual Colonial Report* for these two islands for the period 1913-14 is illustrated by two useful coloured maps, and indicates the increasing importance of their mineral resources. The most important minerals are asphalt, obtained from the famous "pitch lake" of Trinidad, manjak, a form of asphalt, and petroleum, which is rapidly increasing in importance. The number of petroleum wells sunk has shown a great increase, and the product is partly consumed locally and partly exported, the exports in 1913 reaching a value of £75,000. As regards agriculture, the crop of sugar has been showing a tendency to diminish, though it may again increase as a result of the present demand. Of the total area of land under cultivation about three-quarters is devoted to cocoa, the chief agricultural product. Sugar comes next with one-ninth of the total, while a considerable amount of land is devoted to coconuts.

Utilisation of Peat in U.S.A.—The U.S.A. Geological Survey has published a small pamphlet on the distribution of peat in the United States and the extent to which the deposits are utilised. Peat seems to be widely distributed there, especially in the north and east, and it is somewhat remarkable that although the deposits occur chiefly in regions remote from coalfields, yet there is practically no utilisation of peat as fuel. Again, though a small amount of peat is used as litter

("peat moss"), this is all imported from Holland, not made at home. A mode of utilising the beds, which seems to be peculiar to the United States, is the production from them of fertilisers or "fertiliser filler." This is due to the fact that some of the peat in the States is rich in combined nitrogen, and is much decomposed. For fertilising purposes the peat is sold either simply in the dried state, or with mineral salts added. Another use is as stock-food, the dried peat being mixed with liquid food-stuffs, especially molasses. This use is said to be increasing in sugar-growing districts. In 1913, however, the total production of peat in the States was only 33,000 tons, of which by far the greater part, about 28,500 tons, was used as fertiliser.

EDUCATIONAL.

Geographical Education in South Africa.—The efforts of those who have been advocating a more extensive and a more rational study of Geography in the schools and colleges of South Africa are at last beginning to materialise. During the past twelve months perhaps no subject has been more frequently discussed in educational circles, and no fewer than three syllabuses for advanced examinations in Geography have been arranged. Moreover, various courses of training have been provided by the Provincial and Union Education Departments for teachers desirous of obtaining special qualifications in the subject, and thus the foundations of a geographical education which shall be wide in range and scientific in method are being laid throughout South Africa.

To many who left school in the years gone by, even after completing a secondary course, their own country was little more than a "Dark Continent." Now, from the points of view of cultural, disciplinary, imaginative or utilitarian education, few countries in their geographical study offer greater attractions than Africa. The fascinating story of its discovery, the apparent relation between its historical and economic development and its geological structure, the numerous illustrations in recent times of the importance of military geography, the extensive range of climatic conditions and their influence on physique, dress, habits, industries, architecture and place names, the varied nature of its bio-geography, the cosmopolitan population, the economic dependence on other countries, together with the fact that Africa can boast of no mean portion of the world's grandest topographical features—all would seem to advocate a more comprehensive study of the subject than has hitherto existed.

In South Africa, as in most other countries, geographical education has had to fight against prejudice, and the subject is only just beginning to be regarded not as a mere collection of unrelated facts, names, and figures, but as a systematic science tracing through phenomena distributed over the surface of the earth a gradual evolution from cause to effect.

The old complaint of an already over-crowded curriculum has been put forward as an objection to its inclusion in the higher examinations. Hitherto Geography has been taught during only the first two of the five

years of the secondary school course, but specialisation is gradually becoming a feature of education here, and for the first time candidates in the 1915 Junior Certificate Examination (at the end of the third year's study) may select Chemistry or Physics, or Geography. It is hoped that ere long the Matriculation Examination will include Geography and thus provide a means of preparation for the B.A. degree course. None know better than teachers of Geography in South Africa how much the subject has suffered from the fact that it is not reckoned at the annual inspection as a "failing subject." They have arrived at the conclusion that it is unprofitable to devote much time or care to its teaching, and since it brings no "marks," pupils have come to despise it. Although it may seem strange to some, the fact that Geography is to take a place in the more advanced school examinations will bestow a dignity upon it which will appeal to both teacher and pupil alike, and will influence the treatment of the subject from the lowest classes upwards.

Another difficulty, not peculiar to South Africa, is that owing to the sparseness of the population in many vast districts it is extremely difficult to bring within reach of all pupils a higher educational centre staffed by specialists.

Pupil-teachers study Geography during the three years of their apprenticeship, but it is not included in the curriculum for Normal Students. The Education Department, however, has established vacation courses in the subject. These are held during the three weeks' winter recess, and are conducted on the same lines as the Summer Schools of Geography elsewhere. The courses comprise series of lectures illustrated by practical exercises. Geography takes a prominent place in the Union Teachers' First Class Certificate Examinations, which are open to graduates desirous of becoming teachers of special subjects. The course extends overeighteen months, and the candidates in addition to passing an examination in Geography must satisfy the examiners as to their ability to teach the subject in secondary schools. As the demand for teachers possessing this qualification is increasing, the course is becoming more popular year by year.

In 1916 the first examination for the B.A. degree in Geography is to take place. Candidates must have taken the first year's course in Geology and have subsequently studied Geography for two years.

Geography begins at home, and the syllabuses for the Junior Certificate Examination, the Teachers' First Class Certificate Examination, and the B.A. Degree Examination attach supreme importance to a knowledge of South Africa. The economic branches of the subject receive special attention in the various Chamber of Commerce Examinations. In this connection it may be mentioned that the lack of text-books written from the South African point of view has not by any means been the least of the teacher's difficulties. However, this want is now being admirably supplied, and, moreover, the Education Department in Cape Town possesses a library of all the most recent geographical publications which are at the disposal of any teacher in the Province. The comprehensive collections of lantern slides from the same source are also much appreciated.

Unfortunately detailed contour maps of the whole country are not yet available, but this extremely important matter is receiving the earnest attention of the authorities. A fine wall-map of South Africa has been prepared under the direction of the Superintendent-General of Education for Cape Colony. The numerous excellent series of maps which have recently been published, have, in South Africa as elsewhere, considerably facilitated the task of the Geography master.

Thus the foundations of the subject are being laid slowly and surely in the elementary and secondary schools. Success is assured, for the exploratory side of Geography appeals to the South African boy's imagination and love of sport and adventure, the practical branches of the subject appeal to his veldt-bred desire of freedom and open-air, and above all, the commercial side appeals to his keen business instincts.

Perhaps it augurs well that when, in connection with the High School of the South African College, Cape Town, a three hundred mile Geographical Tour, lasting about a fortnight, was organised last summer, no fewer than fifteen students were willing to undergo the hardships which in this country accompany such an undertaking. In the various syllabuses for the Higher Examinations mention has been made of the importance attached to a knowledge of the Home Geography. It has therefore been decided to institute what may be termed a "Geographical Census" of South Africa whereby data may be collected from all sources with a view to the preparation of Geographical Monographs of the various districts. To accomplish this, and in some degree to safeguard the interests of geographical education in South Africa, a number of gentlemen are forming themselves into the nucleus of a Geographical Society. Though South Africa is a land of great distances and hence presents many difficulties of organisation, it is hoped that much profitable work may be accomplished through the medium of correspondence and occasional publications. The Minister for Education and the Under-Secretary are keenly interested in the scheme and are anxious to aid in its furtherance.

The following will give an indication of the type of inquiry it is proposed to make in the several districts. Considerable modifications will, of course, be necessary according to the locality and the available sources of information :—

Geographical Monograph.—Indicate (by outline or shading on enclosed map) the area to be dealt with. *N.B.*—In dealing with the various distributions (geological, climatic, plant, etc.) supreme importance is at all times to be attached to their bearing on the life of man. Where convenient indicate distributions on maps. Give a general description of region, noting configuration, exposure, drainage, forest, bush, pasture, cultivated land, and desert. State directions, approximate distances, areas, heights. Remarks regarding relation of scenery to geological formation. Nature of soil, origin, and depth. Notes on topographical features of special interest, *e.g.* results of denudation, periodicity of rivers, alteration of river courses, disappearance of rivers, hot springs, caves, vleis, etc. Supplementary remarks regarding local methods of preventing erosion, etc.

Climate.—Average summer temperature ; average winter tempera-

ture; variation of temperature (day and night, summer and winter); prevailing winds (their origin, characteristics, and seasons); average rainfall (characteristics). Further remarks regarding climatic phenomena. Information regarding local causes of above, effects of storms on crops, "wash aways," means employed for encouraging rainfall, etc.

Productions.—General description of natural vegetation. Note any local causes of outstanding importance which have led to present distribution. Economic importance of vegetation; methods employed for the destruction of unprofitable plants.

Land under Cultivation.—Trees—(1) firewood; (2) timber, useful or ornamental; (3) fruit; (4) for any other purpose. Cereals—Other vegetable products of economic importance. Note any local conditions specially suited for the production of above, and name other plants which you consider might be successfully cultivated in the locality. Note any special adaptation of vegetation to local geographical conditions. Give particulars regarding any reaction of vegetation on climate or water supply, etc., diseases or pests hindering cultivation, methods of agriculture peculiar to the district, and necessitated by the geographical conditions.

Animals.—More important wild animals, birds, and fish of the district; economic importance of same: remarks regarding local "preserves"; domesticated animals, their value to man, their food, methods of storing food. Note how local conditions (climate, disease, etc.) have affected rearing of certain animals. How do existing geographical conditions (*e.g.* stagnant water) affect distribution of animal life? Note any relation existing between animals and distribution of local diseases affecting man.

Minerals.—Local distribution (indicate on map). Note relation to geographical structure. Useful minerals, annual output; valuable minerals, annual output; in what form found; local uses of minerals. State any actual and possible causes helping or hindering the output of minerals.

Industries.—Chief local industries. Remarks regarding (1) labour supply; (2) distribution of industries among various nationalities; (3) sources of power; (4) local conditions specially favourable or unfavourable to the development of present or future industries. Industrial products. Remarks regarding any other products (*e.g.* those of sea, lakes, rivers, vleis, etc.).

Exports.—Chief exports and their markets (home and foreign). Conditions affecting markets and amount of export.

Imports.—Chief imports; their sources, conditions regulating importation and means of distribution in the locality.

Means of Transport.—How controlled by local conditions.

Chief Trade Routes.—How fixed by local conditions. Remarks regarding any proposed new routes; their probable effect on local industries; distribution of population, etc. Notes on points of strategic importance.

Means of Communication.—Note anything of special local importance.

Centres of Population.—Note local conditions which have led to rise

of towns, villages, or settlements. Distribution of races and nationalities; causes leading to same. Notes on the following:—Influence of local geographical conditions on the physique of the people; habits, customs, sports, punishments, and general life of the people; character and beliefs of the people; dress, houses, place-names, literature. Give particulars regarding birth and death rate, diseases prevailing in locality, and of type of invalid for which locality is specially suitable. Indicate any relation between above and local geographical conditions. Note prevailing religions, and state any geographical causes leading to distribution of same.

Any supplementary information, with quotations or references to authoritative local papers, magazines, or other works. Where possible paper cuttings containing relevant information, photographs, etc., illustrating local geographical phenomena, etc., should be forwarded with above. J. HUTCHEON.

NEW BOOKS.

EUROPE.

Peebles and Selkirk. (Cambridge County Geographies.) By GEORGE C. PRINGLE, M.A., Rector, Burgh and County School, Peebles. With Maps, Diagrams, and Illustrations. Cambridge: At the University Press, 1914. *Price* 1*s.* 6*d.*

Within the compass of 149 pages we have here a much condensed but comprehensive account of the shires of Peebles and Selkirk. Very wisely the author has treated them for the most part as a single area, for, though each has its individual characteristics, in broad general features they are one. Both are in the basin of the Tweed, and indeed comprise its whole course with most of its tributaries from Tweedswell to below Galashiels. The book follows lines familiar to students of the series, but special emphasis is properly laid upon the pastoral and woollen industries. The numerous camps are described in some detail, and a plan is given of the Roman camp at Lyne. Ettrick Forest and Tweeddale were the land of peel-towers. Their distribution is shown on a most interesting map, and in a rapid sketch their uses and structures are portrayed. A somewhat careful reading has revealed only two slips. The first is on page 43 where in the definition of a cyclone the word "outwards" should be "inwards," and lower down where an anticyclone is referred to the word "towards" should read "from." It would also be as well to mention that the direction of winds given is for the northern hemisphere only. But when condensation is imperative it is practically impossible to avoid ambiguity. A similar remark applies to a sentence on page 111, where the road from Moffat to Selkirk has got mixed up with that from Tweedsmuir to Cappercleuch. These, however, are very minor blemishes, and we congratulate the author not only upon his industry, but upon his skill in getting so much into so small a space. The book should be widely read in the two counties described, and also by all those who love the borderland.

Friendly Russia. By DENIS GARSTIN. London: T. Fisher Unwin, 1915. *Price* 3*s.* 6*d. net.*

Both Mr. H. G. Wells (who writes an Introduction) and the author insist upon there being *two* Russias, one of which is the novelists' Russia of passion and

brutality, and the other the pleasant Russia which will be found by the ordinary traveller. Mr. Garstin succeeds in showing how friendly Russians are to British travellers who, like himself, desire to be friendly with them. He mingled freely in Russia with all sorts and conditions of men, and describes them in a series of lively sketches. His opinion of the great middle-class in Russia known as the "Intelligentsia" is that it is "perhaps the most truly cultured bourgeoisie in Europe." But "the difference between Russian and German culture is that the Russian comes from the heart, the German from the brain." He was in Russia when the present war began, and describes the enthusiasm with which the Russians entered into it. He declares that the greatest miracle of all was to see Russia united, and men of all classes and creeds applauding the war. He concludes that "if Russians have found themselves now in time of war, it seems an idle prophecy to say that they will lose themselves again in peace. The result of the war will probably affect the progress and evolution of Russia more than that of any other country."

Thirty-Five Years in Russia. By George Hume. London: Simpkin, Marshall, Hamilton, Kent and Co., 1914. *Price* 10*s.* 6*d. net.*

Of Scottish extraction, Mr. Hume was born in 1836, and sailed as an engineer to Odessa in 1857 to deliver a vessel built in England for the Russian Government. At Odessa he made the acquaintance of Mr. Melville, "a very remarkable Scot," who had lived at Odessa throughout the Crimean War and distributed the Scriptures among the Russian soldiers. The author considers that the Crimean War was, for the Allies, a mistake, but for the Russians "it was the commencement of a new era of freedom and progress, awaking Russia from her long sleep of apathetic indolence," and inaugurating a great series of reforms.

In 1861 Mr. Hume was the first to introduce reaping and thrashing machinery into the Mennonite Colonies of Russia. He tells us that Russian peasants are very superstitious, and that, when the steam thrasher was in operation, a deputation begged the men in charge to call out the unclean spirit that was doing the work, so that they might see it! The author was greatly indebted to a Russian landowner who had 7000 serfs, and he was present in 1861 when all the serfs were assembled to hear the Czar's edict read granting them their freedom. The serfs of Russia were, however, disappointed that they did not get their proprietors' estates as well. Mr. Hume saw much of the peasantry of South Russia, and found them very attractive, being polite and kind and more hospitable than British workmen.

The author gives an interesting account of the Steppes, their agriculture, flora and fauna, their mirages and their locusts, snakes and tarantula spiders. Then he describes life in Poltava and Kharkov. The population of the latter city increased in fifty years to 250,000, and it became, next to Nijni Novgorod, the largest centre of commerce in Russia. It was also a university town, and here Mr. Hume discovered "the very considerable affinity existing between certain aspects of British and Russian character, which renders social intercourse between the two races easy and agreeable." In 1868 the author accompanied English engineers to the rich coal-bearing estates of Ekaterinoslav. He insists upon British importers visiting Russia in order to learn its requirements and be successful there.

Mr. Hume describes the first trial by jury in Kharkov in 1868, and also the Nihilist conspiracies there, in one of which the police apprehended a talented gentleman employed unconsciously by the author and disguised as an office cleaner. He complains of the inquisitiveness of the Russian travelling public, and says they would take hold of his wife's dress, criticise its material and make,

and ask details of her family rank. He likewise classes Russians with Spaniards in putting things off till to-morrow.

He next details a geological tour he made in 1891, during which he visited Kiev, the great intellectual metropolis of South-West Russia, and saw the enormous workings of rich iron ores and the mines of salt, coal, and cinnabar. He also travelled through the Caucasus to Batu, returning by Batum and Sebastopol to Kharkov. Evidently a man of a highly intelligent, active, and practical type, he was a worthy representative of the Anglo-Saxon race, and he shows his good sense by appending to this instructive volume a valuable map of South-West Russia, beautifully engraved by Messrs. W. and A. K. Johnston.

The Campaign in Russian Poland. By Percy Cross Standing. London: Hodder and Stoughton, 1914. *Price* 1*s.* (*Daily Telegraph* War Books Series.)

We have here a description of the first German campaign in Poland, which "closed with success for the Russian arms all along the enormous frontier of nearly 1500 miles in length." After it came a second German invasion of Poland, which is still in progress.

The Russian Problem. By Paul Vinogradoff, F.B.A., Regius Professor of Jurisprudence in the University of Oxford, sometime Professor of History in the University of Moscow. London: Constable and Co., Ltd., 1914. *Price* 1*s. net.*

In discussing "Russia after the War," the author states that "the first and greatest asset of Russia is its peasant democracy. The population of the Empire amounts at present to some 170,000,000, and of these some eighty per cent., that is about 140,000,000, are peasants, small cultivating landowners, in parts rising to the status of what used to be called in old England, yeomanry." With regard to the prevalent Mendicancy in Russia, he considers that "a comprehensive Poor Law is certainly one of the needs of the situation." He points out that Education has made great strides in Russia, and predicts that "the time is approaching when all the children in Russia will receive at least three years' elementary schooling." As for the central Government itself, he considers that "it would be a fatal mistake to indulge in anti-monarchical, anti-dynastic agitation. Even apart from the peculiar circumstances of the moment, Russia needs a strong central power endowed with uncontested sovereignty, armed with the full force of popular delegation." At the same time, "if a Second Chamber is to exist and to play a useful part in Russian political life, the Council of the Empire must be entirely reconstructed." The treatise concludes with the author's remarkable letter on "The Psychology of a Nation," which appeared in the *Times* of 14th September last, in which he shows that in literature, art, science, and history Russia "need not be ashamed to enter the lists in an international competition for the prizes of culture."

How Belgium saved Europe. By Charles Sarolea. London: W. Heinemann. *Price* 2*s. net.*

Belgium and the Belgian People. (The Nations of the War Series.) Edited by L. G. Redmond-Howard. London: Simpkin, Marshall, Hamilton, Kent and Co. *Price* 1*s. net.*

Both of these are "war books," in that they owe their origin to the events of the last half-year. Dr. Sarolea's volume, which contains a useful map of Belgium,

summarises the tragic events which culminated in the taking of Antwerp, and has a final chapter on the problem of the refugees. In the other book we have a general account of the Belgian people, their history, traditions, present day occupations, literature and art. The two should enable the reader to obtain a clearer mental picture of a people whose heroism under their long martyrdom has moved the world.

War Time and Peace in Holland: A Free Farmer in a Free State. By J. W. Robertson Scott. London: William Heinemann, 1914. *Price* 6*s. net.*

Mr. Robertson Scott's book was first published in 1912 under the title which now forms a subsidiary heading. He has added to the new edition a section on Holland in time of war, embodying articles which he has contributed to various newspapers and periodicals since the outbreak of war, and discussing chiefly the question of Holland's neutrality, and her military resources should she decide that her interests make it necessary for her to intervene. The body of the book is taken up with a very careful and detailed account of agriculture and agricultural methods in the country, methods for which the author has a great admiration. The book is one for reference rather than for general reading, and contains a large number of facts of much geographical importance.

ASIA.

A Woman in China. By Mary Gaunt. London: T. Werner Laurie, Ltd. *Price* 15*s. net.*

Mrs. Gaunt, who is a lady with much and varied experience of travel—readers will remember her *Alone in West Africa*—now takes up the well-worn theme of travel in China, and succeeds in breathing new life into it. Starting her explorations in Peking, which she calls *Babylon*, and of which she has much to tell that is fresh and interesting, she travelled by native cart through the mountains to Ch'eng Teh Fu, and beyond it to Jehol, the ancient hunting palace and park of the Manchu emperors. It required some courage for a lady to make such a journey, with only her carters and one native servant for escort, through disturbed country, and enduring the horrors of Chinese inns by the way. Had she hearkened to the advice of friends in Peking, she would never have started on the trip of two hundred and eighty miles over impossible roads, but she persevered and got through. Jehol is worth seeing for its own sake, for the hunting park forms an oasis of greenery set amid the arid, treeless landscape of Chi-Li, and, though the hunting lodge itself, and the pavilions and temples which stud the park, are going to ruin, it is nobly planned and well laid out. This, indeed, may be said of most of the buildings and monuments belonging to the earlier years of the Manchu regime in China, although the towns are filthy to an incredible degree. In this respect the China of to-day probably reflects the conditions which prevailed in mediæval Europe, while the sufferings of the people from disease and overcrowding and dirt are inherent in their present state of civilisation. It was at Jehol, as Mrs. Gaunt reminds us, that the Emperor Ch'ien Lung received Lord Macartney, the first British Ambassador to China, in the year 1793. For over fifty-one years the place has been tenanted only by servants. In 1860 the then Emperor of whom the late all-powerful Empress Dowager Tzu Tsi was the secondary wife fled to Jehol from the British and French allied armies, when Peking was taken and the Summer Palace destroyed, and there the Emperor died.

Tired out by her journey, Mrs. Gaunt felt the need of speech with some one who spoke her own tongue, and she took refuge in the mission station at Ch'eng Teh Fu, where she was kindly received. She frankly owns that her attitude towards Christian missions is that of the Greeks, to whom such things are foolishness, and she grudges the services of the missionaries who work so hard among the suffering poor and trouble themselves about the souls of the Chinese. Describing her visit to a missionary school for blind boys in Peking, founded by the late Rev. Mr. Hill Murray, Mrs. Gaunt speaks of China as being a land where charity is unknown. We venture to say that this is by no means the invariable rule, for the Chinese often give freely to charities, in their own way, and many of the foreign medical missions and colleges are largely supported by native subscriptions. To Mrs. Gaunt it is plain that the people of the country are, in some ways, as a sealed book, and that she only dimly recognises the many good qualities lying beneath an exterior which seems unattractive, and even repellent, to the stranger. But, by way of amend, she quotes R. F. Johnston, the well-known writer on things Chinese, who told her that "they are one of the most charitable peoples on earth."

We can recommend Mrs. Gaunt's book as one of the best and most readable which have been written on China for a long time; and many of the pictures, which are from her own photographs, are most excellent.

On the Trail of the Opium Poppy: A Narrative of Travel in the Chief Opium-Producing Provinces of China. By Sir Alexander Hosie. London: George Philip and Son, Ltd., 1914. 2 vols. *Price* 25*s. net.*

The most famous chapter in the history of British commercial relations with China deals with the opium trade, which fortunately is now apparently doomed for ever. This satisfactory result has removed from the British Empire a serious responsibility, and from China an influence of appalling demoralisation. The change has been due to an agitation which began in 1906. Tong Shoa-yi, a Chinese envoy to Calcutta, there formed the impression that India was prepared to dispense with the opium revenue, and that the responsibility for the continuation of the trade rested on China. Tong Shoa-yi on his return home therefore began a vigorous agitation for the complete suppression of the use of opium in China. He secured the all-powerful support of Yuan-Shih-K'ai, now President of China, and in September 1906 a series of regulations were issued to suppress the use, import, and growth of opium. The regulations were of Oriental thoroughness. Opium cultivation was to be reduced gradually and brought to an end within ten years, and any land at the end of that time used for opium cultivation would be confiscated. It was estimated that thirty to forty per cent. of the population of China were addicted to opium smoking, so that the habit could not be stopped at once. The regulations enacted that no one should smoke without a licence. People of over sixty, with whom the habit had become chronic, were to be allowed to continue without much direct personal interference, but persons under sixty were bound to reduce their consumption of opium by about a quarter per annum; and those who had not given it up altogether at the end of four years were, if officials or Government servants, to resign their offices, and, if graduates, were to be deprived of their rank or diploma; in the case of ordinary civilians, their names were to be placarded as "opium sots," they were to be practically disfranchised, and treated as outcasts from society. All opium houses were to be suppressed, and cures for the opium habit were to be distributed at cost price to those who could pay for them, and gratuitously to the poor. Such regulations could not be enforced without the agreement of those countries which had the right to import

opium into China, of which the chief was India. China therefore appealed to the British Government to protect her from the enforced import of opium. The British Government agreed, provided China really suppressed its own production of opium, and prevented other countries continuing the trade if India abandoned it. The British Government agreed that the export of opium to China should cease in seven years after 1911, provided there was clear proof of the complete absence of production of native opium in China.

In order to test how far progress in this direction had gone, Sir Alexander Hosie made two journeys in 1910 and 1911 through the six Chinese provinces where most opium had been produced. In 1910 he travelled through Shansi, Shensi, and Kansu, as far west as Lan-Chou on the upper Hoang-ho. In 1911 he visited Szechuan, Kueichou, and part of Yunnan. He found that the cultivation of the poppy had entirely ceased in Shansi and Szechuan, and had been reduced in Shensi by thirty per cent., in Kansu by twenty-five per cent., in Yunnan by seventy-five per cent., and in Kueichou by seventy per cent.

In these two beautifully illustrated volumes Sir Alexander Hosie tells the story of his two journeys. In the first he travelled 2064 miles by road in four months, and in the second 6000 miles in 188 days. The volumes consist of the reprint of his journals, in which he carefully records his routes, the direction and distances along the roads, the general features of the country, and observations on the industries, trade, and life of the people. He thus gives a valuable record of the condition of China in those two years, and of the attitude of the people to a European visitor. Probably the most valuable contributions in the book are the abundant observations on the economic botany of the provinces traversed. Sir Alexander Hosie had been the British Consul-General at Tientsin and Consul in Szechuan, and lived in other parts of China. He was, therefore, an expert observer. When he visited Kueichou, the so-called Switzerland of China, in 1882-3 the country, according to his own phrase, was opium-sodden: but by 1911 there had been already an immense improvement, and one of the photographs shows a huge pile of opium pipes collected for burning, and another pile on fire. He reports at the end of the book that the anti-opium crusade suffered a severe check in 1911 owing to the outbreak of the Chinese revolution. But though there may have been a temporary reverse, the political change appears to have accelerated the complete suppression of the trade: for, when passing through parts of China a few months ago, the writer heard on all sides that the trade was at an end, for opium could only be smuggled into the towns with such difficulty that its cost was prohibitive except for the very wealthy. It appears to be generally agreed that the stringent measures for the suppression of the use of opium are being so rigorously enforced that China is practically freed from its greatest curse. Sir Alexander Hosie's book forms an interesting contribution to the story of the close of the opium question, and the description of central China in 1910-11 will be of permanent value. A few notes in the preface on the progress of the anti-opium movement during the past three years, and a statement of Chinese weights and measures in explanation of the statistics quoted, would have been useful.

Arabia Infelix; or the Turks in Yamen. By G. Wyman Bury, Author of *The Land of Uz*. With Illustrations and Maps. London: Macmillan and Co., Ltd., 1915. *Price 7s. 6d. net.*

It is a very clear idea of Yamen that Mr. Bury gives us. We see the hot, barren coastal plain, then the fertile arable land at the base of the foothills. Through these run rivers in deep, well-wooded gorges, beyond which is open, park-like, agricultural country. Next comes the steep ascent to the table-land

which occupies the greater part of Arabia, and, after passing the crest, a long, gentle slope eastwards to the Persian Gulf. With the exception of the coastal plain, aptly called the Tehama, or abode of heat, the whole region is well watered and fertile, until on the table-land thin pasture gradually merges into desert. Despite misgovernment, or rather want of government, and the consequent lack of security, irrigation is much practised, and it is easy to see how little is required to make the land support a teeming population. The natives do not like the Turks and profess to admire British administrative methods, but the author is doubtful as to how far they would really appreciate those methods if they were actually to come under them. The best solution would seem to be an efficient but not too obvious protectorate like that in Egypt. Owing to the badness and insecurity of the means of communication, trade is languishing. The one road in Yamen, that from Hodeida, the chief seaport, to Sana'a, the inland capital, is of extraordinary variability: here a confused mass of boulders: there, but very seldom, suitable for motor-cars. Certain portions are infested by bands of brigands; and, considering everything, it is a wonder that any produce gets through at all. Mr. Bury has much to say about the natives, the Turks, Jews, and the few Europeans: and about the fauna, both from the naturalist's and the sportsman's point of view. A very useful sketch is given of the history of the province, and in conclusion something is said of the future. The illustrations are interesting and well reproduced, but many show signs of over-exposure, which is practically unavoidable, except by using screens, in such blinding sunshine. The map of the Ottoman Empire and its neighbours is rather poor, but the other two are good.

AMERICA.

Dent's Historical and Economic Geographies—North America. By Horace Piggott, M.A., Ph.D., and Robert J. Finch, F.R.G.S. London: J. M. Dent and Sons, Ltd., 1914. *Price* 3*s.*

World Studies, an earlier volume in this excellent series, was a landmark in the extending progress of the study of geography. To say that *North America* is worthy to take its place alongside its predecessor is high praise. The reviewer heard the headmaster of a large secondary school make the remark that his one objection to *World Studies* was the fact that the pupil who was studying geography from this book could dispense with the teacher. There was a good deal of truth in the remark, but surely of both books it is also true that, over and above merely supplying information in a pleasant way, they quicken the imagination and cultivate the reasoning faculty. *North America*, by means of clearly drawn maps, appropriate diagrams, drawings, and photographs, seeks to picture the northern portion of the continent across the Atlantic. Its aim is well achieved. Five sections deal with North America generally, three sections with Canada, the United States, and Mexico, Central America, and the West Indies in detail. The scheme is comprehensive, the information especially full and accurate, and the treatment scientific. Teachers should see this admirable text-book.

Lands Forlorn: A Story of an Expedition to Hearne's Coppermine River. By George M. Douglas. With an Introduction by James Douglas, LL.D. With 180 Photographs by the Author, and Maps. New York and London: G. P. Putnam's Sons, 1914. *Price* 16*s. net.*

This is an account of a journey made by a party of three to the Coppermine River in Arctic Canada. The main object was to ascertain whether copper was obtainable in that region in paying quantities. Dr. Sondberg, the geologist of

the expedition, was successful in tracing and mapping the interesting series of rocks in the lower portion of the river. A large number of samples were brought back, and these, on analysis, have been proved to include profitable ores. Extensive deposits of lignite were also discovered, and, indeed, Mr. Douglas and his companions are to be warmly congratulated on the issue of their well-planned and skilfully conducted expedition. Starting down the Athabasca river with the first days of summer, they gained the head of the Great Bear Lake, where they fixed their headquarters. After a preliminary journey to the Coppermine for reconnoitring purposes, they settled down for the winter. In early spring they again reached the Coppermine, and followed it to the Arctic Ocean. At Hearne's "Bloody Falls" they had a most interesting encounter with Eskimo. Although not absolutely dependent on the country for food, the ample supplies of game and fish made a welcome addition to their larder. Of two appendices the first is an extract from the report of Dr. Richardson of Franklin's expedition, the second is a report by Dr. Sondberg. A topographical sketch map and a geological map come at the end of the volume, which lacks only an index to make it complete. The numerous illustrations are of excellent quality, many of them being most instructive from the geographical point of view.

Heaton's Annual: The Commercial Handbook of Canada and Board of Trade Register. Eleventh Year. 1915. Edited by Ernest Heaton and J. Beverley Robinson. Toronto: Heaton's Agency. *Price 5s.*

An interesting addition to this issue is an alphabetical bibliography of Government Reports and other standard publications relating to Canada, arranged under subject headings and indicating the department, official, or firm to whom application should be made for further information. Thus under the entry *alfalfa* we have a list of various departmental publications dealing with the growth of the plant, and a reference to a book on the subject. Beet-sugar, if we may judge from the bibliography, has had far less attention devoted to it, though there seems no reason why it should not thrive, at least in the east. The bibliography should be useful as indicating lines along which fuller information on special points connected with the economic development of Canada may be sought. Otherwise the *Annual* presents the usual features.

GENERAL.

The Norwegian Aurora Polaris Expedition, 1902-1903. By Professor Birkeland. Christiania: H. Aschehoug and Co., 1913. Vol. i., Parts ii. and iii.

The first part of this great work appeared in 1908, and the present continuation, which has grown to about double the size of what was at first intended, begins with page 321 and ends with page 801. In Part ii., which deals, in the first instance, with Polar Magnetic Phenomena and Terrella Experiments, the author develops at considerable length the consequences of his theory that magnetic storms are due to the precipitation on the earth of helio-cathodic rays. By an elaborate discussion of the facts of observation certain different types of magnetic storm are recognised, and for these he finds a fairly satisfactory explanation in the theory advanced by showing that when, for purposes of calculation, a particular comparatively simple form of cathodic distribution is chosen, results are obtained which fall in line with the observations. His conclusions are also supported by a series of ingenious experiments with a magnetic globe, the so-called Terrella, towards which he directs cathode rays in a prepared vacuum, and with which he reproduces on a small scale appearances very like auroral effects in the

polar regions. A large number of photographs of these striking appearances are reproduced, so that the reader is better able to follow the argument than if there had been description only. Professor Birkeland then proceeds in chapter v. of Part ii. to apply the same general line of explanation to the Zodiacal Light, Comets' Tails, and the Saturnian Rings. These Rings of Saturn he regards as due to the action of a powerfully magnetised globe upon the helio-cathodic rays streaming down upon the planet. The experiments in support of this view are of the greatest interest. With increasing boldness the author goes on to apply his reasoning to the great cosmic problems of planetary solar and stellar systems and nebulæ of all types. The fundamental assumption is the existence of a universal directing force of electro-magnetic origin in addition to the force of gravitation. For the sake of mathematical simplicity each sun is assumed to have in relation to space an enormous negative electric tension, in virtue of which the central body emits considerable quantities of matter in the plane of the equator. Various problems of this new celestial dynamics are worked out, and are tested by experiments with the cathode discharge. It is this appeal to experiment at every stage which gives to the theories advanced a degree of support which no other theory of cosmic evolution has till now received. The return, in Part iii., to mundane problems of earth currents and magnetic phenomena is by contrast a little depressing after those exhilarating flights along the spirals of nebulæ in the far-off regions of space. Nevertheless, it is in itself interesting, and appreciably advances our knowledge of the interplay of these magnetic and electrical effects. It brings together a large number of observations made at different observatories, and presents its material in the form of numerous diagrams. The book is handsomely illustrated, and will undoubtedly take an enduring place in the literature of terrestrial electro-magnetism.

From Heligoland to Keeling Island: One Hundred Days of Naval War. By Archibald Hurd and H. C. Bywater. London: Hodder and Stoughton, 1914. *Price* 1*s. net.*

This little book summarises in sober language the events which have occurred upon the sea from the outbreak of the war to the Pacific engagement at the beginning of last November. The details are, of course, beyond our scope, but the book may be recommended as offering a useful survey of one aspect of the great war up to the date named.

An Almanack for the Year of our Lord 1915. By Joseph Whitaker. London: Whitaker and Son. *Price* 2*s.* 6*d.*

Like the other annuals, Whitaker's *Almanack* has appeared as usual, and at the usual time. As the editor somewhat sadly points out, the page devoted last year to "The World's Peace" and the "Proceedings of the Hague Tribunal" has had this year to be devoted to a short summary of the events leading to the outbreak of war. Elsewhere a diary of the war is given, and otherwise the arrangement is much as usual. The customary summary of the march of science during the year preceding publication occupies pp. 815-820, but there is nothing of especial geographical interest included here.

EDUCATIONAL.

College Physiography. By Professor R. S. Tarr. New York: The Macmillan Co. 1914. *Price* 15*s. net.*

This sumptuous volume, "published under the editorial direction" of Professor L. Martin, is one of the finest productions of the American school of geographers.

The name of the late Professor Tarr is sufficient guarantee of the book's intrinsic merit, and Professor Martin's editing is a labour of love, and as such has been ably executed. Of the twenty-seven chapters, one, the eighteenth, treating of terrestrial magnetism, and six others, dealing with the atmosphere, have been written by the editor as a completion of the author's work. It is enough to say that the seven additional chapters are thoroughly in harmony with the rest of the book.

The qualifications of the late Professor Tarr do not need to be insisted upon to the readers of the *Magazine*—his name is known to all students of geography, and his sudden death left a blank in the honoured roll of American geographers. Taught by Shaler and Davis, Professor Tarr rose to the very front rank as a scientific physiographer, and the present volume is a statement of his views on the subject he knew so intimately. Especially valuable to us are the chapters dealing with the sculpturing agencies, and if any of these separate chapters need commendation we direct attention to Nos. V., VI., and VIII. Land forms are fully treated, and Professor Martin's chapters on the atmosphere are lucid and well reasoned. Wherever possible illustrations, numerous and to the point, are given, and the editor furnishes full bibliographies and lists of maps. The last have always been features of American books, and it would be well if all British text-books followed the practice.

When we say that Tarr's Physiography will stand for many years to come as the rival of Salisbury's, we give the book the highest praise we possibly can bestow upon it.

Physical Geography. By P. LAKE, M.A. With Maps, Illustrations, and Diagrams. Cambridge: University Press, 1915. *Price 7s. 6d. net.*

The author's object has been to fill a gap among text-books by providing one on physical geography for the senior classes in schools or intermediate work in universities, and in this he has fairly well succeeded. In any case he has contrived to write a lucid and readable work which contains a great deal of matter in limited compass. In fact there is more in the book than appears at first sight, for it is concisely written and free from superfluous words and repetition. The book is divided into three parts, Atmosphere, Ocean, and Land. Of these the chapters on the atmosphere are the most useful, for they treat the subject at some length and with freshness of outlook; but, best of all, they are free from the reiterated mistakes about climate which are almost universal in elementary books. Nor does Mr. Lake fall into the error of attempting to simplify climatic questions too much. His chapters are not easy reading, but they will repay any student who takes the trouble to study them attentively. In the parts on the ocean and the land there is less scope for originality of treatment, since both parts of the subject, especially the latter, are comparatively easy to teach compared with the atmosphere, and consequently have been well treated in several works. We can recommend this book both for its plan and in its execution. There are three coloured rainfall maps and several black and white temperature and pressure maps, besides some illustrations and numerous outline diagrams. The price, however, seems rather high; that is the only fault we have to find with the book.

BOOKS RECEIVED.

Five Years under the Southern Cross: Experiences and Impressions. By FREDERIC C. SPURR. Demy 8vo. Pp. viii + 296. *Price 6s. net.* London: Cassell and Co., Ltd., 1915.

Seven Years on the Pacific Slope. By Mrs. Hugh Fraser and Hugh Fraser. With Illustrations. Sm. Royal. Pp. xiii + 391. *Price* 12*s.* 6*d. net.* London: T. Werner Laurie, Ltd., 1915.

In the Lands of the Sun: Notes and Memories of a Tour in the East. By H.R.H. Prince William of Sweden. With 32 Illustrations and a Photogravure Portrait of the Author. Demy 8vo. Pp. xii + 343. *Price* 16*s. net.* London: Eveleigh Nash, 1915.

Forty Years in Canada: Reminiscences of the Great North-West. With some Account of his Service in South Africa. By Colonel S. B. Steele, C.B., M.V.O. Demy 8vo. Pp. xvii + 428. *Price* 16*s. net.* London: Herbert Jenkins, Ltd. 1915.

Old Calabria. By Norman Douglas. Demy 8vo. Pp. vii + 369. *Price* 15*s. net.* London: Martin Secker, 1915.

The Teaching of Geography. By B. C. Wallis, B.Sc. (Econ.), London, F.C.P., F.R.G.S. Demy 8vo. Pp. x + 221. *Price* 3*s.* 6*d. net.* Cambridge: University Press, 1915.

Lodges in the Wilderness. By W. C. Scully. Crown 8vo. Pp. xv + 252. *Price* 5*s. net.* London: Herbert Jenkins, Ltd., 1915.

Round the World in Strange Company: America, British Columbia and the West (Section). By Nicholas Everitt, F.Z.S. Illustrated. Demy 8vo. Pp. xvi + 283. *Price* 12*s.* 6*d. net.* London: T. Werner Laurie, Ltd., 1915.

The Conquest of Mount Cook, and other Climbs: An Account of Four Seasons Mountaineering on the Southern Alps of New Zealand. By Freda Du Faur. Super Royal 8vo. Pp. xv + 250. *Price* 16*s. net.* London: George Allen and Unwin, Ltd., 1915.

Russia and the World: A Study of the War and a Statement of the World-Problems that now confront Russia and Great Britain. With Illustrations from Original Photographs. By Stephen Graham. Royal 8vo. Pp. xiv + 260. Price 10*s.* 6*d. net.* London: Cassell and Co., Ltd., 1915.

The Counties of Clackmannan and Kinross. (Cambridge County Geographies.) By J. P. Day, B.A., B.Sc. Crown 8vo. Pp. viii + 145. *Price* 1*s.* 6*d. net.* Cambridge: University Press, 1914.

The Counties of Moray and Nairn. (Cambridge County Geographies.) By Charles Matheson, M.A. Crown 8vo. Pp. x + 140. *Price* 1*s.* 6*d. net.* Cambridge: University Press, 1915.

Report on the Administration of Burma. For the year 1913-14. Rangoon, 1915.

Colonial Reports Annual.—Uganda (831); Nyasaland (832); British Guiana (833).

Statistical Abstract relating to British India. From 1903-4 to 1912-13. Forty-eighth Number. London, 1915.

Statistical Abstract from the several British Self-governing Dominions, Colonies, Possessions and Protectorates in each Year from 1899 *to* 1913. Fifty-first Number. London.

Report on the Administration of the Civil and Military Station of Bangalore. For the year 1913-14. Bangalore, 1914.

Memoirs of the Geological Survey, Scotland. No. 74. Edinburgh, 1915.

Statistics of the State of Queensland. For the year 1913. Brisbane, 1914.

Annual Report of the Department of Agriculture and Stock. For the year 1913-14. Brisbane, 1914.

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THE SCOTTISH

GEOGRAPHICAL

MAGAZINE.

THE COUNTY OF RENFREW.[1]

By C. A. Scott.

(*With Diagrams.*)

(*Continued from p.* 199.)

Industries.—There are many industries that flourished in the past (being associated with a less complicated stage of economic development) that have now almost completely disappeared. It would not be wise totally to disregard them because they are gone, for in many cases they have a very close connection with the industries of the present day. The hereditary skill that was fostered by generations of ingenious hand-loom weavers was the foundation of some of the industries of Paisley that flourish to-day: and perhaps the sea lore that was gained by the fishermen and coasters of Renfrewshire was the beginning of the great mercantile navy of the Clyde.

The fishing industry, which for obvious reasons has almost disappeared from the places where once it flourished, was the all important occupation of the north-west of the shire at one time. In a description of Renfrewshire which is highly authoritative, and seems to have been written about 1647,[2] we have a good account of the herring fishing, most of the details of which are corroborated in Crawfurd's *History* (a most reliable work). The fishing in the Firth of Clyde seems to have been shared by all the adjacent counties, but both historians allow that Renfrewshire had the greatest share. The old fishing ports in the shire were Greenock, Gourock, Inverkip, and Newark (now Port-Glasgow),

[1] Extracted from a thesis presented for the degree of B.Sc. in Geography of Glasgow University, in August 1914.

[2] "Sibbald MSS.," by Mr. William Dunlop, Principal of Glasgow University, to be found in a *Description of the Sheriffdom of Lanark and Renfrew*, by William Hamilton of Wishaw.

and it is also especially mentioned in both accounts that "The fishing of herring hath for many years been the most noted of any in Scotland, the fish that entered the Firth of Clyde being larger, fairer, firmer and of better taste and taking better with the salt than any other, and more valued both fresh and salted at home and abroad than any other the kingdom affords."

When the industry was at its best, more than 900 boats were employed, each having four men on board. "Also there have been reckoned 3750 tun of herring salted and exported in a year, besides vast quantities consumed within the county." Crawfurd also remarks that "the number of herring taken in the Firth of Clyde some years is almost incredible, considering what hath been made use of by those employed in fishing, cooping, packing and barrelling. In 1674 there was exported to Rochel in France 20,000 barrels besides those exported to other parts in France, Sweden and the Baltic." The fishing season commenced in July and lasted until December, the season being under strict Government regulations. The salting and packing must have been an industry in itself, giving much employment, especially at Greenock. At that port in 1670 a company was formed, with a considerable amount of capital, to cure herring, under the patronage and charter of King Charles II. The fishing industry has now almost passed away, at least from the Renfrewshire ports, but perhaps not before it had enriched the towns to a certain extent, and laid the foundation for greater industries.

Fishing was the occupation of the north-west corner of the coastal parishes: the activities of the inland people, other than those employed on the land, were turned to various home industries of which weaving was the chief. Weaving was of course an occupation of great antiquity. The women occupied themselves with spinning, and their produce was taken to the local weaver. In Renfrewshire, however, weaving rose from being only an occupation to supply local needs, to an industry of considerable extent.[1] At one time every farm had its patch of flax, which was spun and bleached at home and then sold to the merchants of Paisley, who retailed it to the weavers of the district. The growing of hemp also in the fertile lowlands was a good source of supply of raw material.

It is certain that the trade grew and centred in Paisley, which is the natural focus of communication for all the surrounding villages. Here as early as 1695 there were 66 weavers in the burgh itself; 32 in the Abbey Parish; 30-40 in Kilbarchan, and 9 in Kilmalcolm. Flax and wool were woven, and at first only the coarser fabrics were produced. The weaving, like many other of the Scottish industries, received a great impetus by the Union of 1707, when free trade with England was opened. Soon checkered linen handkerchiefs and afterwards fabrics of a lighter and more fanciful texture, some of them plain lawns, others striped with cotton, and others richly figured, were produced. In 1786 the manufacture in Paisley reached a yearly value of £165,000.

[1] See *History of the County of Renfrew*, by Dr. Metcalfe.

The trade of the shire was kept alive by the energy and enterprise of the people. The opening of the Glasgow, Paisley and Johnstone canal in 1811 must have helped commerce greatly; but perhaps the readiness with which the people started new branches of the weaving industry and the ease with which they adapted themselves to them was the real source of the success of the trade. About the middle of the eighteenth century the making of linen gauze had been introduced and developed rapidly; and in 1759 the making of silk gauze was started in imitation of the gauze produced at Spitalfields. The success of the new department exceeded all expectations; elegant and richly ornamented silk gauzes were soon produced in great variety and of such curious fabrication as outdid everything of the kind that had formerly appeared. In 1789 some 10,000 people were employed in the manufacture of silk gauze and 12,000 more in the making of lawn cambric, thread gauze, and muslins. In 1784 silk gauze employed 5000 looms in and around Paisley.

The success of the trade was largely due to the industry and individuality of the Paisley weavers. As a class they were men of great intelligence. They had cultured tastes, and a great love of beauty; also a characteristic independence of judgment which was fostered by the system of working, each man as his own employer, independent and free to work how and when he pleased.

In a time of trade depression, the manufacture of muslin was started and put on a successful basis. The manufacture of shawls, however, was a venture that showed at once the enterprise and the refined taste of the Paisley weavers. The industry was at first very limited, and confined to the production of plain silk shawls. This was followed by the introduction of a more elaborate type. This, oddly enough, was said to be a far-reaching result of Napoleon's expedition in Egypt. At that time beautiful Indian shawls were sent home by the officers of the British and French armies. A copy of these beautiful hand-worked Cashmere shawls was produced on the loom by the weavers, after much patient perseverance, and soon Paisley shawls acquired national fame. Imitations of the silken striped scarfs and turbans worn by the natives of oriental countries were also made.

In order to keep the trade on a level with the French shawl trade, real Cashmere wool was imported, and for years Paisley shawls were fashionable to the extent of being necessary appendages to the wardrobe of the élite. Some of the shawls were sold for £20, and in a single year shawls to the value of a million sterling were made in Paisley. This promising industry, the outcome of so much skill and labour, was ruined with tragic suddenness. The shawls simply went out of fashion, and not even the Queen could bring them back to favour. Queen Victoria ordered seventeen shawls just at the time of the decline of the industry, and she even used one at the christening of the Prince of Wales, but it was of no avail. The trade was born and had expired within little more than a lifetime.

The introduction of the power loom was the deathblow to the home industry which once flourished in every village in the shire. Little more than half a century ago, however, it was prosperous in Kilbarchan,

Johnstone, and Lochwinnoch. In the village of Kilbarchan the industry has made its last stand, for even to-day there are a few hand-looms worked by men of a past generation, who are not likely to be succeeded in an occupation which is perhaps more picturesque than productive. Textile fabrics are still manufactured to some extent in the factories at Paisley.

Cotton Industry.—Cotton spinning was early introduced into the shire, and though the trade has completely died out in many places, in others it is still carried on under modern conditions. Its introduction seems to have been simultaneous with the rise of the industry in other parts of the country. The proximity to the port of Glasgow, from which much of the yarn was exported, had doubtless much to do with the localising of the industry.

Within two years of its first introduction into the country, a cotton mill was built in Renfrewshire. The first mill was built in 1780 on the Levern Water at Barrhead. Another was soon built at Busby on the White Cart; and in 1782 a large mill was built at Johnstone. This mill, situated on the Black Cart, and driven by water-power, was the beginning of the town of Johnstone, which, previous to the erection of the mill, consisted only of a few houses near the Brig of Johnstone. Mills speedily arose on the Gryfe, at Lochwinnoch, Linwood, Kilbarchan and Neilston. In 1812 there were nineteen in the county, not including some in Paisley and Pollokshaws. The good water supply of the shire, and the well-known advantages of a moist climate for cotton spinning, together with the cheapness of land and the good supply of labour, were all causes that made the industry locally successful.

The spinning of this rough cotton yarn is now a dead industry in Renfrewshire. The fine cotton thread of Paisley is a separate industry and will be mentioned later. The cause of the decline is rather doubtful. The cotton famine of 1861-4, a result of the American War, has been advanced as the reason. This may have been the final blow, but it is certain that the industry was on the decline before that. The manufacture of linen thread and the engineering industry had begun to replace cotton spinning as far back as 1860. In fact, many of the old cotton mills were sold and became engineering establishments. At Johnstone, where there were once twenty-six cotton mills, not one remains as such. Many are still to be seen as gaunt old ruins, while others have been modernised and are now thread mills, foundries, and paper mills.

Of the modern industries of Renfrewshire, and indeed of the industries all along, it has been a characteristic and healthy feature that there has been a great variety of manufactures, and an absence of any exclusive specialisation. The advantage is obvious. Few are the times when all trades are depressed at once, and Renfrewshire has therefore always a share in the nation's labour, through one or other of her many industrial activities. By this it is not meant that there has been a lack in developing some of the industries to their furthest state of efficiency. On the contrary, there are in Renfrewshire two industries that display a pre-eminence in their branch over any other part of the United Kingdom.

But the specialisation is not like the cotton of Lancashire, where there are a great number of towns given over exclusively to one industry.

Shipbuilding.—Of the modern industries, shipbuilding, with its many allied trades, is supreme. The shipbuilding on the Clyde is comparatively speaking not an ancient industry. This must be obvious when we reflect on the fact that the Clyde ports themselves are comparatively new, and the development of the Clyde for shipping and shipbuilding was an enterprise of modern engineering. The fame of the Clyde began with the advent of steam navigation and steel-built ships: though the beginning of the shipbuilding industry is of more ancient origin.

We have no reason to believe that the ships that engaged in the herring fishing in the firth in olden times were built on the Clyde. In fact it is not likely: it is more probable that they were built at the more ancient ports of Irvine and Ardrossan. It was not until 1707 that a harbour was built at Greenock: but from that date onwards the shipping activities of the Clyde increased steadily and even rapidly. In 1760 the first graving-dock in Scotland was built at Port-Glasgow. This was perhaps the first of a long series of initiatory movements that the Clyde has taken in the sphere of shipbuilding.

In the second half of the eighteenth century Greenock had made a good start in shipbuilding. Its fine position gave every facility to the industry, and the increased shipping and commerce produced a demand for ships. In 1791 the largest ship built in Scotland was launched from Scott's yard at Greenock. By 1818 there were five extensive shipbuilding yards in the town. The enterprise of the shipowners, shipbuilders and merchants of Glasgow had no small share in the development of the industry. The Clyde has also been fortunate in the stimulus that it received by local invention. The steam engine and its application to navigation were inventions the introductory experiments of which were carried out on the Clyde. In 1812 the famous *Comet* was run for the first time, and this proved only to be the beginning of a new epoch in naval architecture, to which the Clyde shipbuilders adapted themselves with great alacrity.

The last hundred years have been remarkable for the multitude of inventions and novelties of design that have taken place in naval architecture, and in these the Clyde has held a distinguished position. The necessity of keeping well ahead with improvements in order to keep alive the trade had been early realised by Clyde shipbuilders. The first steamer, the first turbine passenger boat, and the first turbine ocean liner, have all been produced on the Clyde. The invention of the steam engine also brought about the rapid development of the coalfields of Lanarkshire and Ayrshire. These in turn made possible the production of steel and iron on a large scale, and with the era of the steel-built ship the Clyde has again been peculiarly favoured with a ready supply of raw material. Such are the many factors that have made the Clyde one of the greatest shipbuilding centres in the world. In fact the phrase "built on the Clyde" has become a hall-mark of shipbuilding.

In this Clyde-side industry Renfrewshire takes first place among the

surrounding counties. Greenock, Port-Glasgow, Gourock, Renfrew and Paisley all possess shipbuilding yards, and the industry is pursued in almost every one of its many branches. Port-Glasgow heads the list with the larger ocean craft; it is the site of Russell & Co.'s yard, which has for several years made the highest annual tonnage of any single firm on the Clyde. The total in 1910 was almost twice that of the next yard in order of tonnage. Then comes Greenock with many huge yards and docks, where men-of-war as large as the super-dreadnought type are built. In the building of dredgers, Renfrew leads the world. The dredgers of John Brown & Co. have been used in almost every important excavation work in Britain, and are also found in every part of the globe. Gourock has a speciality in motor boats and racing yachts. Paisley also builds a few craft, but the navigation of the Cart is a problem that has still to be faced before the shipbuilding of the town can expand.

In 1910 the Clyde produced 400,000 tons of shipping, and of this Renfrewshire claims one-half, which makes shipbuilding perhaps the most extensive and lucrative industry in the shire. The most recent addition in this line is the torpedo factory at Greenock established by Government. The great stretch of Loch Long as a testing-ground for the torpedoes is said to be the advantage that has brought the work to the Clyde.

Thread.—The second industry for which Renfrewshire takes the leading part in Scotland is the manufacture of cotton and linen thread. The industry is of ancient origin, and was introduced at first for local supply only.

At the beginning of the eighteenth century the local supply of thread came from Holland, as the people had no method of twisting the yarn into a thread. The wife of a local minister brought from Holland a hand-twisting mill and started to make the thread for domestic purposes. Her thread soon acquired great local fame, and samples of it were taken by ladies of the shire to Bath, where it was greatly admired. Orders soon arrived for thread, and the domestic occupation became an industry. It was started in Paisley in 1722, and by 1784 one hundred and twenty machines were twisting thread in Paisley, and the industry soon rivalled those of Dundee and Aberdeen.

The fine linen thread which was made exclusively at first was soon surpassed by cotton thread, which was much cheaper and finer, and was evolved by the production of a fine cotton yarn by Lancashire machines. Toward the end of the century the manufacture had an annual value of from £60,000 to £100,000. The trade was not without vicissitudes, and especially in 1812 the unsettled state of affairs on the Continent greatly depressed the thread industry. Two factors, however, combined to fix the trade permanently in Paisley. It has already been mentioned that in the nineteenth century the shawl trade declined. This gave to the market a big supply of cheap and highly skilled labour, which was naturally turned into the thread trade. The invention of the sewing-machine also made a greatly increased demand; therefore with a big demand and a ready supply of labour Paisley got well ahead with

the industry. The town is now the seat of the largest thread mills in the world. All the mills are in one combine, and hold a monopoly of the industry. In 1890 when J. & P. Coats became a limited liability company, the firm received £5,750,000 for the property and business.

Engineering is now one of the most important modern industries in the shire. The variety of machine tools and machinery produced have made the various towns of Renfrewshire of considerable note. The industry of course owes its great development to the proximity of the coal and iron fields of Lanarkshire, and to the great demand for machinery in the manufactures and shipbuilding that sprung up with the advent of the steam engine.

The lowland towns of the shire have now become great mechanical workshops. There is marine engineering at Greenock and Paisley, also the making of pumps, steam steering-gear, capstans, winches, and all kinds of deck machinery. At Johnstone as well as at Paisley machine tools of every description are made, lathes, punching and shearing machines, wood-working machinery, etc. Renfrew is the seat of the great water-tube boiler works. Factory machinery is also produced for the use of local industries. There are also foundries and forges and other allied branches to produce the castings and accessories for the machines.

There are no blast furnaces or steel works in the county, and this little disadvantage has caused it to specialise in the more intricate and highly skilled machine tools, on which the expenditure of skill and labour is large in comparison to the cost of material.

There are no other industries that are conspicuously great, though the remaining minor branches are legion. The *Sugar Refining* at Greenock was started in 1765, previous to which sugar came there only for local use. The industry was doubtlessly started by the import trade. The refining at Greenock was at one time pursued to a greater extent than anywhere else in the country. It has now greatly declined, however, though Greenock is still the headquarters of the trade. The competition of the continental beet sugar, bolstered up by the bounty system, has been the cause of the decline.

Bleachfields have always been very numerous in the county. In Neilston Parish at one time they were very extensive. The many clear streams with an abundant supply of water which is free from salts in solution has doubtlessly brought the industry to Renfrewshire. In 1791 there were twelve bleachfields in Neilston Parish alone. There are still large bleachfields at Howwood, Paisley, Neilston, Barrhead, Mearns, and Houston. *Print Works and Dyeing* are carried on at Thornliebank, Barrhead, Neilston, Newton Mearns and Paisley. *Tanning* is an ancient industry in the shire, formerly carried on at Paisley. Bridge-of-Weir is still the seat of a large tanyard. *Chemical Works* were started at Hurlet in connection with the extraction of alum and other chemicals from the shale that was mined there. Coal has been mined at Hurlet for over three hundred years. Paisley has also developed chemical industries. The Clyde ports have rope factories, sailcloth works, and manufactures of other smaller articles necessary for shipping.

There are other manufactures which are but camp followers of the

great industrial army. They are not specially connected with any economic advantage other than the supplying of a large industrial area, the obtaining of surplus labour, and the facility of transit which the more important industries have created. Such are starch-making, corn-flour, tobacco, confectionery and preserves, soap-making and carpet-weaving. Paper is made at Paisley, Linwood, and Kilbarchan.

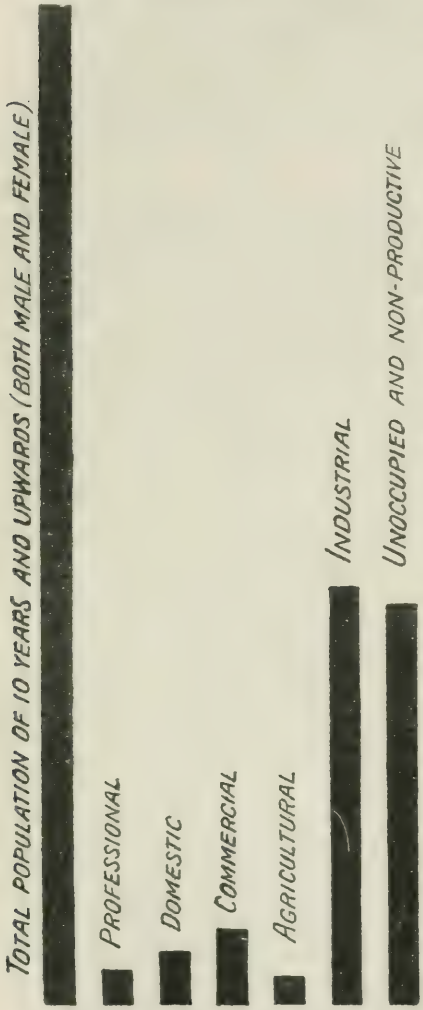

FIG. 2.—The occupations of the people.

The history and present position of the industries have been outlined, and their variety is astonishing. An idea of the relative importance of each can be seen by a graphic representation of the occupations of the people, divided into six classes (Fig. 2). An analysis of this gives an idea of the well-balanced distribution of activities, agricultural, maritime, and industrial, with which the shire is blessed.

Economic Geography.—The climate and physical features of the shire having been discussed, it only remains to show how those natural resources have been developed for economic purposes and put to the use of man.

The combined efforts of the climate, position, and relief of the county have determined its agricultural limits; the green pastures characteristic of the western shires have made it chiefly a dairy-farming county, and made the growing of oats and root-crops the chief agricultural products. The flat-topped, rain-swept moorlands have also their place in the economics of the shire. They have become the water-supplying areas so essential to the towns, and their proximity has made them doubly valuable. Greenock has an excellent supply from the Gryfe Reservoirs just above the town to the south. Johnstone, Paisley, etc., are supplied from the heights on the south of the Kilbirnie Gap; while further east there are valuable auxiliaries to the ever-increasing demands of the city of Glasgow.

The rocks of Renfrewshire have also enriched its resources to a

large extent. No true Coal Measures exist in the shire, and mining is not an extensive industry. There are mines, however, where coal is found in the Carboniferous Limestone Series, at intervals over the lowlands. The coal mining was important in the days of cruder pit machinery, and before the great inventions developed the coalfields of Lanarkshire in a manner such as to dwarf the resources of Renfrewshire. The supply for local purposes was at one time considerable, some good seams being found near Johnstone, where there was also an outcrop of coal at the surface. In all, less than one thousand miners are employed to-day. In 1908 97,000 tons of coal were produced, an imposing looking figure, until it is compared with the millions of tons of Lanark and Ayr.

The iron ores of the county are of more value, however, and in this there is a favourable comparison with Lanark. The blackband ironstone, at one time rejected in ignorance as "wild coal," gave a great impetus to the iron-mining in the nineteenth century. The exhaustion of the better ores, however, and the decline of Scottish ores in general, has greatly reduced the production.

The building stones quarried in the shire are of great economic value, both for their use and for their proximity to the demand. It is remarkable that within a mile or two of those localities where economic reasons have dictated that a great city should be built, Nature has supplied the building stone for its erection on a liberal scale. Out of the famous quarries of Giffnock three-quarters of Glasgow have been built, and this local supply is handsomely reflected in the substantial and even beautiful stone edifices of the city, which give it a stamp of superiority when compared to the monotonous rows of brick buildings characteristic of the cities of the English plain.

The Giffnock sandstone, and the old red sandstone of the west coast, have made Renfrewshire the chief source of building stone in Scotland. In 1908 over 150,000 tons were produced. The limestone beds are also important. The Orchard and Arden limestones are employed for many purposes in building. Quarrying is carried on at Barrhead and Thornliebank. In 1908 20,000 tons were produced.

The volcanic rocks of the uplands make a very good quality of road metal, and all over the shire these hills are notched with the quarries from which have come the paving material for the roads of this and other counties. This is a matter of great economic importance, for just in the very high ground where road material would be costly to bring up, it is often quarried by the very roadsides in a series of little bunker-shaped excavations at intervals along the high road. In Renfrewshire truly the rocks have been the friend of man and have yielded of their abundance to him.

The physical features and relief have been no great hindrance to communication in Renfrewshire. It is true that there is a fair amount of high ground and consequently waste moorland, but these heights do not form the barrier to the coast they might have been. The two rift valley gaps have been of the greatest economic importance, as they have formed easy natural routes to the coast and to the plains of Ayr to the south.

The position of the shire has had no small share in its development. At first its position put it at a slight disadvantage, for it was on the flank, rather than on the track of civilisation. There were no through roads such as passed through Lanark to England. But if the early land routes put it at a disadvantage, the sea has always been its friend. A county with a seaboard which is suitable for the construction of harbours and which possesses any internal resources cannot long be isolated. The commercial potential of the place is soon linked to its opposite pole by routes along which trade must inevitably flow.

The seaboard of Renfrewshire was at first on that side of Britain that faced the great unknown. Consequently the fishing industry was the first maritime activity to which the people of the coast devoted themselves. But the coastal trade also grew up, and trade with Ireland became a factor of no small importance. Thus the resources of the west early found an outlet by the ports of Greenock, Renfrew, and Paisley. The discovery of America, and the establishment of trade with it, the discovery of steam power, and the consequent development of the coal-fields, were factors that wrought great changes in the development of the county. With these discoveries Renfrewshire entered upon a new epoch of industrial life, and soon began to develop with great rapidity.

The geographical advantages of the county for shipping were too obvious to be neglected. Greenock, especially well situated, was eager to develop its port, and soon began to be impatient with the petty charters and rights which alone fettered its development. Hitherto fishing had been the chief occupation, but the Union of 1707 gave a great impetus to the trade, which formerly consisted chiefly in exchanging the herring for the timber of the Baltic. In the eighteenth century Greenock engaged in the whale-fishing, but trade with the West Indies and America soon began to eclipse other occupations. In 1710 a harbour was opened for the first time. By 1775 Glasgow and Greenock were importing 57,143 hogsheads of tobacco per annum from Virginia, Maryland, and Carolina. During the second half of the eighteenth century the principal imports were rum, cotton, sugar, coffee, dye, wood from West Indies; rice, potash, cotton, tobacco, etc., from America; wines and fruit from Spain, Portugal, and the Mediterranean. Coal was exported to America and the West Indies, and sugar, coffee, and rum to Europe. The opening of the Forth and Clyde Canal also induced a coasting trade between Greenock and the east coast as far south as London.

During the last hundred years the growth of the port has been immense: graving docks, harbours, and quays have been added in a long succession of improvements. To-day the trade of Greenock is still increasing. In 1912 the imports were valued at £2,315,081, and consisted chiefly of wheat and grain, iron and steel, paper-making material, seeds, sugar, and timber. The exports were valued at £664,899, and included coal, iron and steel goods, and ships.

The widening and proper navigation of the Clyde has been the great scheme in which the interests of the county have been bound up; and though it has been more a problem of Glasgow, yet Renfrewshire has naturally benefited greatly by the scheme.

The merchants of Glasgow required a port, and to the Clyde they early turned to supply their needs. As early as 1556 Glasgow, Dumbarton, and Renfrew combined in an endeavour to remove the ford at Dumbuck and the most prominent "hirsts" (sandbanks), to improve the navigation of the river, which for thirteen miles below Glasgow was so interrupted by fords and shoals as to be barely navigable for small craft. In 1602 another attempt was made to remove the Dumbuck ford, after which all the improvements were left to Glasgow.

When the second effort to widen the river failed, the merchants of Glasgow decided to build an out-port for Glasgow. Hence Port-Glasgow was constructed as the nearest approach to the sea, from which goods were taken by pack-horse to the city itself. Some years later attention was again drawn to the Clyde, and by means of a system of jetties and by extensive dredging a great improvement was made. In 1781 there were 14 feet of water at Dumbuck ford. From this time on progress was rapid. Act after Act was sanctioned for the improvement of the river. Steam dredging, however, and the adoption of steam hopper barges have been the means of bringing the river to its present state of efficiency.

Thus by dint of its position and the enterprise of the Clyde Trust the resources have been developed to the full, and the Clyde is now the greatest centre of shipbuilding and shipping in the country. The port of Glasgow alone surpasses in tonnage the remaining combined ports of Scotland, and the port of Greenock comes fourth in Scotland in order of tonnage.

The natural beauties of the lochs and isles of the Clyde estuary have been opened to the world by the magnificent fleet of pleasure steamers possessed by the railway companies, a fleet unequalled for beauty, comfort, and speed by any river craft in the country. Thus the tourist traffic has become a little industry in itself. Two of the railway companies have their marine headquarters in Renfrewshire—the Caledonian Railway Company at Gourock, and the Glasgow and South-Western at Greenock.

Perhaps no shire has made more of its resources than Renfrew; the county, once on the flank of commerce and pierced by a stream whose shallows formed an easy ford for pedestrians, is now a national gateway to the west, through which mighty ships of the world are carried down the great waterway whose name is a synonym for everything that is splendid in engineering and shipbuilding.

Population.—The grouping of the population would, in Renfrewshire as elsewhere in Britain, be determined by the relative slender wants of an agricultural community. It is probable that the high moorlands were always (*i.e.* within historic times) the most scantily populated. The high ground in the south-east, however, in the neighbourhood of Eaglesham parish, has always been the best populated part of the uplands. The village of Eaglesham is an upland village of great antiquity. It was a centre and market village for the upland rural district, and stood on the king's highway. Springs are everywhere abundant, hence the widespread distribution of farms and holdings.

Paisley has been from all time the central village or town of the shire. The monastery built in the twelfth century by the side of the White Cart was the beginning of the town, which has always been the administrative centre of the shire. The villages around are almost without exception built on streams: Kilmalcolm, Bridge-of-Weir, Houston on the Gryfe: Lochwinnoch, Linwood, etc., on the Black Cart; Neilston and Barrhead on the Levern Water: Pollokshaws and Busby on the White Cart.

In the days when the mining of the shire was relatively important, there were several mining villages, such as Quarrelton. But these villages have greatly dwindled, some having almost entirely disappeared, for the coal has either given out, or has been too costly to work for its relative value. There are other villages round Clippens where iron and shale were once worked, but these have shared the fate of the coal villages, as the pits are now worked out.

With the development of the coal-fields of Scotland, and machine manufactures, several small towns have sprung up and smaller villages have grown into towns. Paisley, originating as the religious and administrative centre, has been kept alive and greatly extended by modern industry, and has now a population of over 80,000 people. Johnstone, three miles south-west of Paisley, is a typical example of a town due to the development of the coal-fields. One hundred and fifty years ago there were only six houses where there are now over 12,000 inhabitants. Barrhead and Pollokshaws are similar cases.

There has been no great change in the locus of population, but great increase has taken place. The development of the Clyde, and, since the Union of 1707, free trade with England and her colonies, also the rise of industries due to the coal-fields, have all caused the population to increase with great rapidity. In the western coastal margin, the rise of the ports of Greenock, Port-Glasgow, Gourock, etc., has made the coastal strip a concentrated centre of population.

In recent times, the changes have been, as elsewhere in Britain, a decrease in the rural population and a great increase in the urban and sub-urban. Many of the surrounding villages and towns, such as Kilmalcolm, Bridge-of-Weir, etc., are merely suburbs of Glasgow, where city gentlemen have their homes, with easy access to business, and where great numbers of city-employed people reside, finding there houses of cheaper rent and more congenial homes. There is no tendency for Glasgow to depopulate the smaller towns round about, or even for the trade to migrate to the large centre. In fact, if anything, the increase is with the smaller places, such as Paisley, Barrhead, Johnstone, etc., where land is cheaper than in the heart of the city, and whence there is good communication by rail and road to the ports of Clyde.

It would seem that the population has settled on a fairly permanent basis, and as far as can be seen there is nothing in the near future to cause an oscillation of population. The small-holding system may, however, bring back to the land a little of what it has lost; and new industries may bring additional population to the present centres. As long as the river Clyde flows and can be adapted to modern shipping,

there is every likelihood that Renfrewshire will retain its great industrial population.

The population of the shire in 1911 was 314,574. The density was 1312·9 persons to each square mile. Fig. 3 gives a comparison of Renfrewshire with Scotland in area and in population.

Communications.—The position of the county puts it out of the track of any roads of national importance. Renfrewshire stands just a little apart from the main road from England by the west to the centre of Scotland. Whatever through roads therefore traversed the shire in olden times were not likely to be very busy thoroughfares of traffic. A few gleanings from history, however, tell us that such roads or tracks existed. Several times when kings of Scotland visited Ayr and the south-west, they invariably passed through Renfrewshire, going via Paisley to Ayr. Several of the invading armies of England also penetrated into Renfrewshire, and retired in a south-westerly direction through the county. A section of Cromwell's army is known to have passed from Glasgow to Irvine via Paisley. It is difficult to tell what routes were taken at that time, but it is highly probable that the Loch Libo Gap was the chosen track. The Kilbirnie Gap was always more impassable by reason of the lochs and marshes that at one time extended over it. The Loch Libo Gap, on the other hand, besides being the easier route, is the shorter way from Glasgow to Ayr. Along these lines of communication, however, it is certain that there was nothing of the nature of a road. A horse track was all that it could be termed, and wheeled traffic was almost unknown. Even in the days when Port-Glasgow was the port of Glasgow, all the goods were conveyed by pack-horse to the city.

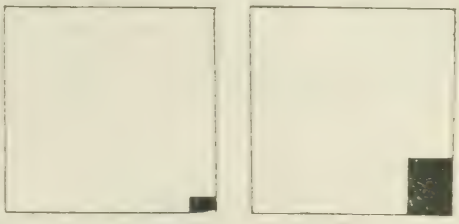

Fig. 3.—Comparative areas and population of Scotland (*a*), and of Renfrewshire (*b*).

It was not until the beginning of the eighteenth century that roads began to evolve from the horse track to highways that were adapted for the conveyance of commerce. It then became more clear what tracks were destined to become fixed lines of communication, for the important factors that determine routes began to come into play. First of all, there is the question whether there is a demand for communication between two places, and when this has been answered in the affirmative, a route will very soon be found.

The fact that we have through roads in Renfrewshire was determined by the need that the densely populated area of Glasgow had for communication with the fertile plains of Ayrshire and the south of Scotland generally. The way that the routes were to go was determined by natural conditions. As Renfrewshire lies between Glasgow and Ayrshire the routes between these two places must inevitably pass through the shire.

Perhaps there is no county in Scotland that illustrates better than Renfrew how the directions of routes have been controlled by the relief of the land (Fig. 4). It has already been mentioned that the hills forming a barrier across the south-west of the shire have been trenched by two rift-valley gaps, and these natural lines of communication are now the busiest routes in the shire. The raised beach round the coast, and the vale of Gryfe, are two other very convenient natural routes.

The Loch Libo Gap is one of the most important channels of communication in Scotland, for through it runs the main Glasgow and South-Western Railway line from Glasgow to Carlisle and England via Kilmarnock and Dumfries. The gap is a remarkably convenient railway

Fig. 4.—The Gaps of Renfrewshire.

route, for though the hills on either side rise to nearly 1000 feet above sea-level, the summit level of the railway is only about 400 feet above the sea. The Caledonian line from Glasgow to Ardrossan also runs through this gap a little higher up the slope. A first-class road from Glasgow to Irvine and Kilmarnock traverses the gap in a line parallel to the Glasgow and South-Western Railway.

The Kilbirnie Gap, a little further west, is the easiest route of all to the south. The gap is a broad, flat valley; at the watershed the floor is little more than 100 feet above sea-level. The Glasgow and South-Western Railway Company run two lines down this route:—the main line to Ayr and Stranraer, which has at Kilwinning a branch passing west to Ardrossan and then north to Largs. The railway line to Largs is a conspicuous example of the control of a route by physical features.

From Paisley to Largs as the crow flies is only seventeen miles, while the distance by rail, made necessary by reason of the hill barrier, is thirty-six miles.

The road traffic in the Kilbirnie Gap is also very important. The first-class roads pass down the valley floor, while less important roads skirt the hills on either side. At one time a canal was projected to use the Kilbirnie Gap. The scheme was planned before the thought of navigating the Clyde was entertained. The canal was to connect the port of Ardrossan with Glasgow and to have Ardrossan as the out-port to the city. The site of the canal was surveyed and the probable cost estimated, and permission was granted by Act of Parliament for its construction. The work was started but never got further than Johnstone. The Glasgow to Johnstone branch was opened in 1811 and was used as a waterway for many years, carrying a very considerable amount of traffic. The canal was never completed. It was found that the probable cost had been seriously underestimated, and before the money was forthcoming the development of railways had already begun. The Glasgow and South-Western Railway Company purchased the canal and constructed a railway over its site. The "Canal line" to Paisley, and Paisley Canal Station are the only relics that survive to tell of the existence of the canal.

The raised beach round the coast is also a convenient route for road and rail. The Caledonian line turns north-west at Paisley and runs by Houston and Bishopton to the river at Langbank. Thence it goes along the old raised beach to Port-Glasgow, Greenock, and Gourock. Before reaching Gourock the Wemyss Bay line leaves the shore, for between Greenock and Inverkip the hills are trenched through by a deep valley that forms a convenient short cut, and is therefore utilised by the railway. The line ends at Wemyss Bay pier, just on the county boundary. A first-class road follows the railway in both its branches from Langbank to Wemyss Bay.

The broad valley of Gryfe is used by the Glasgow and South-Western Railway as their route to Greenock and the coast. The railway turns to the north-west at Elderslie, passing through Bridge-of-Weir and Kilmalcolm. A break in the hills enables it to reach the river side above Port-Glasgow, whence it runs to Princes Pier in Greenock.

In the lowlands of the county, in the north-east, road communications are very perfect. First-class roads cross and recross in all directions, many of which are exceptionally broad and have been recently adapted for motor traffic. The streams are all bridged, Inchinnan Bridge having been built as early as 1753. The roads going north converge on the ferries across the Clyde, where modern signboards direct motor traffic to Oban and the north. Roads on the hills are naturally less frequent, especially in the north-west, where there is not a single road over the hills to the coast. In the south-east, however, hill roads are more frequent. Some of these are very old roads and rise to over 700 feet above sea-level. They are relics of the days when the traffic went by high roads. The modern tendency is for traffic to keep lower and lower down, especially since locomotion has become faster, and consequently

the upland routes are less frequented. Across the hills in the south-east, however, where roads are more in demand to get a short route from Glasgow to Ayrshire, there is a first-class road. This road passes from Glasgow by Newton Mearns and across the moors to Fenwick and Kilmarnock. This short route is not followed by a railway, for the obvious reason that a height of over 700 feet would have to be negotiated.

The only waterway within the shire (not taking account of the Clyde) is the White Cart, which is navigable from Paisley to its confluence with the Clyde. At Inchinnan Bridge it is canalised to avoid shallows at that point.

The county of Renfrew has gained a certain industrial and commercial status among the counties of Great Britain. Its position in the midland valley of Scotland and on the coast, coupled with its natural resources, has been the fundamental factors of its development, but the human element also has played no small part. The resources of the land have been developed by the people with great energy and skill. Inventive genius has been brought to bear in keeping the industries abreast of the times; and enterprise has not been lacking in supplementing by artificial means the elements that Nature has given on a less bountiful scale. Thus the reaction of man on his environment has led to a development that has been extremely rapid. The most sanguine economist that could have viewed with a speculative eye the Clyde and its surroundings one hundred and fifty years ago, could never have dared to foretell such a mighty waterway, though the secret of its being was hidden in the rocks around him.

To-day we are perhaps in a similar position. It is certain that there are opportunities for further development, now and in the future. Will the sugar industry of Greenock revive with the present blockade of commerce on the continent, or will Renfrewshire merchants find new markets or new branches of trade for the same reason? Will the pursuit of science and knowledge wrest further secrets from Nature? Already we hear of new sources of energy being talked of, and tidal power being discussed: and in connection with the latter we must remember that Renfrewshire is a coastal shire. Future development will certainly depend on how new and undiscovered resources are taken advantage of. It is difficult to surmise what may be. The future has generally a power of its own of surpassing all expectations; and like those that looked into it a century and a half ago, we cannot tell what latent resources and dormant energy are yet to be developed for the further advancement of Renfrewshire.

DESERTS.[1]

By Prof. J. W. Gregory, F.R.S., D.Sc.

The term "desert," according to modern usage, means a country which is unoccupied in consequence of having an arid climate. Various exact limits of the conditions that establish deserts have been proposed. Thus Sir John Murray adopted a ten-inch rainfall as the desert limit, and Wm. Macdonald (1911, *Dry Farming*, p. 91) that of twenty inches as the limit of the arid region. Goodchild, on the other hand, rejected numerical limits as arbitrary and impracticable, and he proposed a more elastic definition based upon a general deficiency of moisture. Walther has truly pointed out that deserts cannot be precisely defined on biological, morphological, or climatic grounds.

The factors that control the development of desert are not only climatic. The geological structure of the district has an important influence. The presence of rocks which are very permeable owing to porosity or jointing, and which crumble into coarse grains, facilitates the development of desert conditions. Geographical structure is also important, for a plateau which has a free drainage to adjacent lowlands is more easily converted into desert than an area with no easy escape for its subterranean water.

The climatic influence depends not only upon the total amount of rainfall but upon its distribution through the year. Thus a country where the rain falls in the late summer and autumn may be economically desert, whereas the same rainfall at a more suitable season would render the country fertile. The Transvaal, for example, is hampered by its only certain rains falling in midsummer between November and March. Temperature and the complex group of factors which determine the rate of evaporation also have an important influence. Hence the development of desert is not determined by any rigid minimum of rainfall, but by the balance between the many conditions which govern the utilisation of the rain.

Deserts are most easily produced and least curable where the rainfall is low, the temperature is high, the wind is strong, and the country consists of a plateau where there is an easy drainage to the adjacent lowlands. On a high plateau, the elevation, by lowering the temperature and by cooling the air uplifted on to it, tends to secure rain, though if it drains easily to the lowlands the main value of the rain may be on them. Proximity to the sea is quite consistent with desert development; for if the sea water be colder than the land the capacity of the air for moisture is increased as it blows ashore; and a sea wind may therefore act as a drying and not as a moisture-carrying agent.

Desert and non-desert conditions have frequently alternated in the same district. Thus in the British area there is evidence that desert conditions prevailed during the times of the Torridon Sandstone, the

[1] Abstract of a Paper contributed to the discussion on Deserts at the British Association Meeting in Melbourne, August 1914.

Old Red Sandstone, the Permian, and the Trias: there is also evidence of an arid climate in Ireland during part of the lower or middle Kainozoic. It has been suggested that the existing deserts are now increasing; but evidence (recently summarised in the *Geographical Journal*, vol. xliii., 1914, pp. 148-172, 293-318) indicates that there has been no general expansion of the desert areas, which, however, in some places are shifting their positions in consequence of local climatic changes.

Deserts are not absolutely incurable, and many once desert areas are now in profitable occupation owing to a better knowledge of how to use their slight and irregular rainfall. When suitably watered, deserts may be extremely prolific; for their soils are often rich in immediately available plant foods which have accumulated during a long period of rest. Desert soils especially accumulate salts of potash and lime, which would be leached out of them by a heavier rainfall. The desert soils, moreover, are often very deep, and their crops are nourished from an unusually thick layer.

Australian soils have as a rule less phosphoric acid than the amount usually accepted as the minimum required for cultivability. Thus according to the analyses collected by Prof. Cherry, English soils have ·098 per cent. of phosphoric acid, American ordinary soils ·116, and American clay soils ·207; yet the heavier soils of Victoria have only ·06, and the

	Soil.			Soil.	
	No. of Analyses.	Percentage of P_2O_5.		No. of Analyses.	Percentage of P_2O_5.
England,	12	·136	Congo,	8	·224
South England,	8	·145	Madagascar,	13	·268
Scotland,	2	·310	Java,	3	·12
Spain,	1	·16	Sumatra,	3	·136
Holland,	8	·125	Hawaii,	45	·221
Jersey,	3	·151	India,	18	·010
Hungary,	1	·26	United States of America,	2	·120
North Sweden,	9	·063	,, ,, (Cornell),	40	·194
Germany,	5	·089	Mississippi,	4	·0575
Hanover,	10	·150	,,	2	·385
Russia,	1	·160	Louisiana,	1	·15
South Africa,	6	·035	Texas,	1	·20
German East Africa,	46	·096	California,	5	·172
Senegambia,	3	·0723	Florida,	2	·1
Cameroons,	5	·2624			
				267	

light soils of the Mallee country in north-western Victoria only ·047. Prof. Cherry's facts are confirmed by a varied series of 267 soil analyses from Germany, Holland, Spain, Hungary, Jersey, Sweden, Russia; Java, Sumatra, India; the Sandwich Isles; the Congo, the Cameroons, Senegambia, German East Africa, South Africa, and Madagascar. The number includes 22 British soils and 57 from various parts

of the United States of America. In these 267 analyses the percentage of phosphoric acid varies from ·38 to a usual minimum of ·06, though it may fall to ·01 in the tropics: the average is ·157 per cent., which is far more than the average in Victoria.

Most soils contain more phosphoric acid in the soil than in the subsoil, and this advantage the Australian soils do not share. A series of 220 analyses collected for me from standard agricultural journals and works by Mr. P. Brough show the composition of various soils and their subsoils. Most of these analyses are included in the following table:—

	Soil.			Subsoil.		
	Depth.	No. of Analyses.	Average Percentage of P_2O_5.	Depth.	No. of Analyses.	Average Percentage of P_2O_5.
Japan,	To 50 cm.	9	·049	Below 50 cm.	6	·029
Cuba,		2	·515		2	·455
Russia,	1 to 1·10	10	·170	Below 1·10	13	·123
,,		6	·084	Subsoil	3	·026
Bulgaria,		1	·475		1	·291
Germany,	To 48 cm.	2	·040	Below 48 cm.	8	·039
,,		7	·145		7	·115
Ireland,		1	·191		1	·177
SE. England,		8	·12		8	·61
U.S.A. (Rocky Springs),		1	·265		1	·180
N. Louisiana,		5	·072		5	·046
Texas E.,		5	·068		5	·064
Black Prairie,		10	·227		10	·311
Panhandle,		1	tr.		1	4·23
Alluvium,		3	·103		3	·18
Minnesota,		26	·20		26	·17
Samoa,	To 25 cm.	3	·192	Below 25 cm.	2	·260
Cameroons,		2	·097		2	·214
		102			104	

The analyses in this collection give an average of ·158 per cent. of phosphoric acid in the soil, and ·135 in the subsoil: and excluding a couple of subsoils in which the result is so high that there must be an inclusion of some phosphatic fragment, the ratio of phosphoric acid in soil to subsoil is 16 to 13. In some cases the soil may owe its excess of phosphoric acid to manure; but the excess is often shown in cases in which the land has not been manured. These series of analyses confirm the view that Australian soils are exceptionally low in phosphorus and do not follow the general rule that the soil is more phosphatic than the subsoil. The only explanation of these two abnormal features of Australian soils that appears satisfactory is that proposed by Prof. Cherry of Melbourne University. According to his interpretation the usual superficial phosphatic accumulation is due to the action of mammals, and owing to the poverty of Australian mammalian life no such phosphatic enrichment of the soil has taken place. Some areas therefore in Australia, which

once appeared to be incurable desert, may, owing to the excellent mechanical qualities of their soils, prove of high value if their poverty in phosphoric acid be remedied by fertilisers, while they are automatically improved by use as sheep runs.

LAND FORMS AND LANDSCAPES.[1]

By J. D. Falconer, M.A., D.Sc., Lecturer in Geography in the University of Glasgow.

(*With Illustrations.*)

IV. The Classification of Land Forms.

As with the subject-matter of other natural sciences, the principles of classification of land forms may vary. Emphasis may be laid either upon the external shape, or upon the internal structure, or upon the processes through which the various forms have originated, and such classifications may be termed respectively morphological, structural, and physiological.

Professor Herbertson[2] has suggested a morphological classification based upon certain "elementary" forms or "forms of the simplest order." These are—

1. The ridge, where the land rises on both sides to a maximum line known as the crest.
2. The mount, where the land rises on all sides to a maximum point known as the summit.
3. The table, where the land rises on all sides to a maximum surface.
4. The furrow, where the land falls on both sides to a minimum line.
5. The hollow, where the land falls on all sides to a minimum point.
6. The depression, where the land falls on all sides to a minimum surface.
7. The col, where the land rises on two opposite sides, but falls on the two other sides at right angles.
8. The plain, where the land is practically level.
9. The cavern, where space is almost completely surrounded by land.

These forms may then be subdivided according to modifications of size and shape. A ridge, for example, may be knife-edged or serrated, rounded or truncated. A mount may be conical and either peaked, truncated, or rounded; dome-shaped and either symmetrical, elliptical, or crested; columnar and either angular or rounded, peaked or truncated; pyramidal and either triangular or polygonal, truncated or stepped. A furrow may have an angular or rounded floor, a regular or irregular slope, vertical or sloping walls. A plain may be a low-level or high-level plain, with a uniform or variable slope or an undulating surface.

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[1] Continued from p. 181.

[2] *Handbook of Geography*, vol. i. p. 41.

It is evident that such a morphological classification as this introduces precision into the description of topographic forms. The various groups, however, must necessarily include forms which differ greatly in origin, Superficial resemblances are emphasised to the exclusion of all genetic considerations. This is the general objection which may be urged against all purely morphological classifications.

A classification of land forms should on the other hand bring out something of the hidden meaning which is responsible both for the variety of individual forms and for the similarity which may frequently be observed between different forms. To this end it has been suggested that a classification might be set up according to the petrographical character and arrangement of the rocks within the earth's crust. Forms

Photo by Carlos Moreira.

FIG. 14.—Fluted and pitted granite, Brazil.

may be classified as characteristic of (1) Igneous Rocks, (2) Sedimentary Rocks, (3) Metamorphic Rocks. The forms of Igneous Rocks may be subdivided according to mode of occurrence, massive or bedded habit, perfection and character of the jointing, etc. The forms of Sedimentary Rocks may be subdivided according to hardness, jointing, inclination, and perfection of stratification, while the forms of Metamorphic Rocks may be subdivided according to inclination, jointing, cleavage, and degree of schistosity. Such a classification serves a useful purpose in emphasising the dependence of the form in many cases upon the natural structure of the rocks. It appeals, however, more to geologists than to geographers, the latter being accustomed to regard both petrographical character and structure as controlled by or controlling the activity of subterranean or superficial forces, rather than as fundamental factors affecting the development of land forms.

This naturally raises the question of whether a satisfactory classifi-

cation of land forms can be set up upon a purely physiological basis, the results of the various processes being tabulated together in separate groups. When we turn, however, to current text-books of physical geography and geology, we find that, while the processes are exhaustively described with a wealth of illustration from many parts of the world, either no attempt is made at the classification of land forms or the authors pass on to the discussion of landscapes under the various headings of mountains, valleys, plateaus, and plains. It would seem either that there is no clear distinction in the authors' minds between land forms and landscapes, or, if there is, that they consider that land forms are sufficiently classified in the course of their description of processes.

The most complete classification of processes is to be found in Geikie's *Textbook of Geology*, where the description is arranged under the following heads, the reader being warned that the subdivision is employed merely for convenience :—

A. Hypogene Action.
   1. Volcanic Action.
   2. Earthquake Action.
   3. Secular Upheaval and Subsidence.
   4. Other Crustal Changes.

B. Epigene Action.
   I. The Action of the Air.
      1. Destructive Action.
      2. Reproductive Action.
   II. The Action of Water.
      1. The Action of Rain.
         a. Chemical Action.
         b. Mechanical Action.
      2. The Action of Underground Water.
         a. Chemical Action.
         b. Mechanical Action.
      3. The Action of Brooks and Rivers.
         a. Chemical Action.
         b. Mechanical Action.
            (1) Transporting Power.
            (2) Excavating Power.
            (3) Reproductive Power.
   III. The Action of Terrestrial Ice.
      1. The Action of Frost.
         a. Destructive Action.
      2. The Action of Snow.
         a. Conservative Action.
         b. Destructive Action.
      3. The Action of Ice-sheets and Glaciers.
         a. Transport.
         b. Erosion.
         c. Deposition.

IV. The Action of Oceanic Waters.
  1. Erosion.
    a. Chemical.
    b. Mechanical.
  2. Transport.
  3. Reproduction.

V. The Action of Life.
  1. Destructive Action.
  2. Conservative Action.
  3. Reproductive Action.

A similar but less complete subdivision of the subject-matter is employed by other authors. Obviously it is recognised that the so-called epigene agents, air, water, ice, sea, life, are not by any means simple

Photo by A. E. Robertson.

FIG. 15.—Ice-worn slopes of Glen Nevis.

forces or activities, but really complex forces exhibiting many and varied activities. Each agent is, as it were, a group of forces, capable of subdivision into elements. The demonstration of these simple forces is apparently sufficient for the purposes of geology, where the processes are of more importance than the topographical results. In geography, however, where attention is directed more particularly to the evolution of the topographical features, the system of subdivision adopted in the case of the processes should be one into which individual forms can be readily fitted. It is true that many forms are not the result of a simple or single activity, but of the joint action of various activities or forces. The floor of a valley, for example, is hollowed out partly by the corrading power of the stream, partly by the chemical disintegration of the rocks, partly by the solution of certain mineral substances in the rocks, partly by the mechanical action of frost or wind, partly, it may be, by

the action of glacier ice. Such forms, therefore, are polydynamic, not monodynamic. Usually, however, it can be ascertained without much difficulty which particular force has been most active in the production of any particular form, and the form in question may then be classified with the group of forms produced by that force.

If now an attempt be made to base a classification of land forms upon Geikie's subdivision of the processes, it will be found that some of the activities enumerated do not produce definite surface forms at all, while others seem capable of still further subdivision. This means that the geological and the geographical processes do not entirely correspond, and it becomes necessary therefore for geographers to establish for themselves a physiological classification of the geographical processes which may in turn

Photo by H.M. Geological Survey of Scotland.

FIG. 16.—Glen Rosa, Arran.

serve as a basis of classification for the resulting land forms. A notable and praiseworthy attempt in this direction is that of Professor Passarge, who urges the desirability of classifying Land Forms like the subject-matter of other natural sciences into orders, families, genera, and species or special forms. His classification has been already noticed in these pages,[1] and is repeated here with the exception of his special and polydynamic forms, for which the reader is referred to the original monograph.[2]

LAND FORMS.

Class A. Endogenous Forms.

ORDER I. TECTONIC FORMS.

Family 1. Flexure Forms.

Genus a. Convex Forms.

b. Concave Forms.

[1] *S.G.M.*, vol. xxx. p. 539. [2] *Mitt. des Geog. Gesell. in Hamburg*, Heft 2, Bd. xxvi.

Family 2. Fracture Forms.
Genus a. Block and ridge lands.
b. Sunk lands.
Family 3. Fold Forms.
Genus a. Symmetrically folded mountains.
b. Asymmetrically folded mountains.
c. Overthrust and folded mountains

Order II. Volcanic Forms.

Family 1. Intrusions.
Genus a. Intrusions without change of Form.
b. Intrusions with change of Form.
Family 2. Eruption Forms.
Genus a. Explosive accumulations.
b. Effusive accumulations.

Class B. Exogenous Forms.

Order I. Accumulation Forms.

Family 1. Water Accumulation Forms.
Genus a. Mechanical Accumulation Forms.
Sub-Genus 1. Fluvial Accumulation Forms.
2. Pluvial Accumulation Forms.
Genus b. Chemical Accumulation Forms.
Sub-Genus 1. Spring Deposits.
2. Cavern Deposits.
Genus c. Superficial Mass Movements.
Family 2. Ice Accumulations.
Genus a. Bottom or Ground Ice.
b. Glacier Ice.
Family 3. Glacial Accumulations.
Genus a. Moraines.
b. Fluvio-glacial Accumulations.
Family 4. Aeolian Accumulations.
Genus a. Dune lands.
b. Loess Deposits.
Family 5. Accumulations due to changes of temperature.
Genus a. Insolation Accumulations.
b. Frost Accumulations.
Family 6. Plant Accumulations.
Genus a. Autochthonous Accumulations.
b. Allochthonous Accumulations.
Family 7. Animal Accumulations.
Genus a. Accumulations due to land animals.
b. Marine reefs.
c. Pelagic Accumulations.
Family 8. Accumulations due to action of the sea.
Genus a. Wave Accumulations.
b. Tidal Accumulations.
c. Current Accumulations.

Order II. Denudation Forms.

Family 1. Water Denudation Forms.
Genus a. Erosion Forms.
Sub-Genus 1. Fluvial Erosion Forms.
2. Pluvial Erosion Forms.
3. Erosion through mass movements.
Genus b. Solution Forms.
Family 2. Ice Erosion.
Genus a. Glacier Erosion.
b. Snow-water Erosion.
Family 3. Aeolian Denudation Forms.
Genus a. Mechanical Erosion Forms.
Family 4. Physical Destruction Forms.
Genus a. Insolation Forms.
b. Frost Forms.
Family 5. Destruction Forms due to lightning.
Genus a. Mechanical Forms.
b. Chemical Forms.
Family 6. Marine Destruction Forms.
Genus a. Wave Forms.
b. Tidal Forms.
Family 7. Plant Destruction Forms.
Genus a. Mechanical Forms.
b. Chemical Forms.
Family 8. Animal Erosion Forms.
Genus a. Mechanical Erosion.
b. Chemical Erosion.

Passarge's system of classification is of great interest and value, and is one with which every systematist must make himself familiar. At the same time it does not commend itself in every respect to the writer. Difference of opinion arises with regard to the establishment of certain families and genera, and also with regard to the treatment of certain polydynamic forms. The classification suggested below follows Passarge's method of subdivision of forces and forms into classes, orders, families, genera, and species, but embodies modifications and alterations of Passarge's system in accordance with the opinions expressed in these articles.

Class A. Endogenetic Forms.

Order I. Negative Forms.

Family 1. Negative Forms due to superficial volcanic activity.
Genus a. Effusion Forms.
b. Explosion Forms.
Family 2. Negative Forms due to sub-crustal volcanic activity.
Genus a. Flexure Forms.
b. Fracture Forms.
Family 3. Negative Forms due to radial movements.
Genus a. Flexure Forms.
b. Fracture Forms.

Family 4. Negative Forms due to tangential movements.
Genus a. Flexure Forms.
b. Fracture Forms.

Order II. Positive Forms.

Family 1. Positive Forms due to superficial volcanic activity.
Genus a. Effusion Forms.
b. Explosion Forms.
Family 2. Positive Forms due to sub-crustal volcanic activity.
Genus a. Flexure Forms.
b. Fracture Forms.
Family 3. Positive Forms due to radial movements.
Genus a. Flexure Forms.
b. Fracture Forms.
c. Disruption Forms.
Family 4. Positive Forms due to tangential movements.
Genus a. Flexure Forms.
b. Fracture Forms.

Class B. Exogenetic Forms.

Order I. Degradation Forms.

Family 1. Degradation Forms due to the action of the run-off.
Genus a. Sheet Corrasion Forms.
b. Sheet Solution Forms.
Family 2. Degradation Forms due to the action of percolating water.
Genus a. Chemical Disintegration Forms.
b. Solution Forms.
c. Corrasion Forms.
Family 3. Degradation Forms due to the action of streams and rivers.
Genus a. Line Corrasion Forms.
b. Line Solution Forms.
Family 4. Degradation Forms due to the action of life.
Genus a. Diffission Forms.
b. Excavation Forms.
Family 5. Degradation Forms due to the action of lightning.
Genus a. Diffission Forms.
b. Fusion Forms.
Family 6. Degradation Forms due to the action of sun-heat.
Genus a. Physical Disintegration Forms.
b. Diffission Forms.
c. Liquefaction Forms.
Family 7. Degradation Forms due to the action of the atmosphere.
Genus a. Sheet Corrasion Forms.
b. Chemical Disintegration Forms.
Family 8. Degradation Forms due to the action of frozen water.
Genus a. Diffission Forms.
b. Corrasion Forms.
Family 9. Degradation Forms due to the action of the sea.
Genus a. Corrasion Forms.
b. Diffission Forms.

Order II. Aggradation Forms.

Family 1. Aggradation Forms due to the action of the run-off.
Genus a. Sheet Alluvial Forms.
Family 2. Aggradation Forms due to the action of percolating water.
Genus a. Dislocation Forms.
b. Precipitation Forms.
Family 3. Aggradation Forms due to the action of streams and rivers.
Genus a. Torrential Forms.
b. Alluvial Forms.
c. Dislocation Forms.
Family 4. Aggradation Forms due to the action of life.
Genus a. Aggregation Forms.
b. Dislocation Forms.

Photo by H.M. Geological Survey of Scotland.

Fig. 17.—Storm-beach at the mouth of the Deveron.

Family 5. Aggradation Forms due to the action of lightning.
Genus a. Dislocation Forms.
Family 6. Aggradation Forms due to the action of sun-heat.
Genus a. Dislocation Forms.
b. Evaporation Forms.
Family 7. Aggradation Forms due to the action of the atmosphere.
Genus a. Aeolian Forms.
b. Precipitation Forms.
Family 8. Aggradation Forms due to the action or presence of frozen water.
Genus a. Snow Forms.
b. Ice Forms.
c. Dislocation Forms.
d. Moraine Forms.
e. Glacieluvial Forms.

Family 9. Aggradation Forms due to the action of the sea.
Genus a. Storm-beach Forms (Fig. 17).
b. Marine alluvial Forms.
c. Dislocation Forms.

The classification of Endogenetic Forms is very imperfect. The subdivision from the point of view of relief into Negative and Positive Forms corresponds with the subdivision of Exogenetic Forms into Degradation and Aggradation Forms.

Sub-Orders may be conveniently established as follows: —

A. Endogenetic Forms.

Order I. Negative Forms.

Sub-Order A. Volcanic Negative Forms.
Families 1, 2.
B. Tectonic Negative Forms.
Families 3, 4.

Order II. Positive Forms.

Sub-Order A. Volcanic Positive Forms.
Families 1, 2.
B. Tectonic Positive Forms.
Families 3, 4.

B. Exogenetic Forms.

Order I. Degradation Forms.

Sub-Order A. Pluvial Degradation Forms.
Families 1, 2, 3, 4.
B. Arid Degradation Forms.
Families 5, 6, 7, 8.
C. Marine Degradation Forms.
Family 9.

Order II. Aggradation Forms.

Sub-Order A. Pluvial Aggradation Forms.
Families 1, 2, 3, 4.
B. Arid Aggradation Forms.
Families 5, 6, 7, 8.
C. Marine Degradation Forms.
Family 9.

This subdivision is only approximate, as in the case of the classification of processes, and serves merely to indicate the distribution of the maximum activities of the various families of forces. An attempt will be made in the next article to show the content of the various genera.

(To be concluded.)

THE PHYSICAL GEOGRAPHY OF ICELAND.[1]

UNDER the auspices of the "Carlsberg" fund of Copenhagen there is at present being published a monograph on the botany of Iceland. Section 2 (1) of Part I. describes the physical geography of the island with the special purpose of exhibiting the main features of plant distribution. This task has been entrusted to Professor Thoroddsen, himself an Icelander, who has travelled over practically the whole country, and who has acquired a knowledge of it unequalled and indeed unapproached by any one else. His geological and topographical maps attain a very high standard, and his whole work is a striking example of what can be done with far from unlimited resources by one imbued with patriotic zeal.

The pamphlet—it is really a book though bound in brown paper—consists of 152 pages. Chapter I. deals with general topography, glaciers, the snow-line, rivers, lakes, geology, and volcanoes and lava-streams. The next discusses conditions pertaining to surface and soil. Then follows a description of the climate. In the fourth and fifth chapters we have an account of the general distribution of the plant life, and a sketch of the chief plant formations. The whole is illustrated by 27 photographs, a diagram, and 8 maps. Unfortunately there is no index, and no table of illustrations. We should like to have seen a large map of Iceland, but possibly this is added to one of the other volumes.

The area of Iceland is about one-fourth greater than that of Ireland. The island forms a dissected plateau with an average height of about 3000 feet above sea-level. Rather less than one-fifteenth of the country is lowland. More than two-thirds are so lofty as to be desert, and with very few exceptions only the coastal fringe and the lower courses of the rivers are inhabited. The west, north, and east coasts are much broken up by fiord-like inlets and bays: the south coast is almost featureless. Dr. Thoroddsen mentions that the huge streams from the snowfields have filled up the fiords and created dangerous shallows along the shore, but he does not refer to the lofty cliffs south-west of the Vatna Jökull and ten miles inland, which indicate a certain amount of crustal movement.

The account of the jökulls or snowfields or glaciers—for the word is applied indiscriminately to both—is all too short. In a tabular statement 23 snowfields are given from which descend 142 glaciers, the whole covering 5000 square miles, or one-eighth of the island. The largest is the Vatna Jökull in the south-east, where precipitation is greatest. Of the snowfields three are more than 500 square miles in area: many are quite small, the tiniest being less than half a square mile. Both Arctic and Alpine types of glaciers occur, but much work remains to be done in regard to these. Even the author has examined

[1] *The Botany of Iceland.* Edited by L. Kolderup Rosenvinge, Ph.D., and Eug. Warming, Ph.D., Sc.D. Part I. 2. An Account of the Physical Geography of Iceland, with special reference to the Plant Life. By Th. Thoroddsen, Professor, Ph.D. (Published by the Aid of the Carlsberg Fund.) Copenhagen: J. Frimodt. London: John Wheldon and Co., 1914.

only the fringes of the Vatna Jökull, and very few measurements of the rate of glacier movement have been made. The height of the snow-line varies from about 1300 feet on the north-west peninsula to more than 4300 feet on the north side of the Vatna Jökull. A glacier on the south side of the latter—the Breithamerkur, we think—ends only 30 feet above sea-level.

Iceland contains many rivers whose volume is out of all proportion to their length. They are classified as mountain or clear streams and glacier or milky streams, the latter being much the larger. Very few bridges exist, and the rivers are crossed by fording, most of them being much too swift to permit of ferries. The position of a ford frequently changes from day to day, and a party crossing usually calls upon the services of a local expert as guide. Fortunately the island ponies are very sure-footed, and if left alone will faithfully follow their leader. It is truly remarkable what they will carry. On one occasion I saw in a remote region an American organ, and was informed that it had been conveyed for many miles slung between two of these ponies. The destructive action of the rivers is very great. South of the Vatna Jökull the low land has been largely covered with gravel and rendered quite unproductive.

Lakes are numerous in Iceland. The best known are the famous Thingvallavatn, formed by subsidence connected with geologically recent volcanic activity, and Mývatn, also in a volcanic region, but merely occupying a depression in the lava. The latter, from the abundance of wildfowl which frequent it, is a great resort of sportsmen: the former is intimately associated with the history of the people. Some of the snowfields have glacier-lakes on their margin, Graenalón at the edge of the Vatna Jökull resembling the Märjelen See. In most of the lakes and rivers salmon and trout fishing is of great importance, large sums being realised by letting the waters to foreign anglers.

The geology of Iceland is comparatively simple. In Tertiary times a row of volcanoes extended from Antrim by way of the Hebrides, the Faröes, and Iceland to Greenland. In mid-Tertiary times portions of this land-mass subsided, leaving things pretty much as they are now. The non-volcanic rocks of Iceland are insignificant, the most important being the product of the Glacial Epoch. Basalt is the commonest rock. It exists in layers, the result of successive flows, and beautiful columns are not uncommon. The famous Iceland spar, the only mineral of economic value, occurs in vesicular cavities. In some places lignite and remains of tree trunks are found embedded in clay and tuff. This points to the destruction of forests by lava-streams and pumice-eruptions. O. Heer states that in early Tertiary times the average annual temperature of the island was at least 50° Fahr., nearly 20° above the present mean. Oaks, pines, elms, and alder abounded—a great contrast to the existing "forests" of birch and willow.

Iceland is the home of volcanoes. In historic times 138 eruptions from 30 volcanoes have been recorded, but no fewer than 130 post-Glacial volcanoes are known. The most famous is Hekla, which has broken out 21 times in a thousand years. Enormous lava-fields extend

from it. From them sand is blown by the wind, overwhelming the grass-land. Owing to the foolish destruction by the inhabitants of a protecting belt of coppice, the sand is gradually advancing west of Hekla with most devastating effects. Volcanoes occasionally break out from under the snowfields. Huge quantities of ice are thus instantaneously melted, the water rushes down upon the lowland, and large areas are laid waste. The dust and scoriæ ejected have a deleterious effect upon vegetation, cattle and sheep die from eating it, and famine follows. After the terrible outbreak of the Laki crater-rows in 1783, apart from the live-stock and people directly killed, there died 11,500 cattle, 28,000 ponies, and 190,500 sheep. The resulting famine killed 9500 of the inhabitants, about one-fifth of the whole population at that time.

Violent earthquakes frequently occur in well-defined areas, some connected with volcanoes, others with lines of weakness. The worst in modern times took place in 1784 and 1886. As a rule the range of the shocks is small.

No account of Iceland would be complete without a reference to the hot springs. At present 677 are known. The great majority contain hot or boiling water, but only a few are spouting springs. The Great Geyser, 70 miles north-east of Reykiavik, is now in its old age, and often remains quiet for days together. Its neighbour, Strokkur, which used to respond to doses of turf or soap, was destroyed by the earthquake in 1896. Sulphur springs occur in several localities, but always in connection with the palagonite formation. Owing to scarcity of labour and lack of transport facilities, the export of sulphur, which was important from the thirteenth to the sixteenth centuries, and which has occasionally been spasmodically revived in recent times, has now entirely ceased. Alkaline springs are common in the basalt districts, but are not economically important.

The remaining portion of the monograph, devoted largely to plant distribution, is of much interest, not only in itself but as an aid to comparison with similar regions elsewhere, but we have space only for one or two outstanding points. The first is that we have now what seems to be a complete explanation of the mounds which have puzzled every traveller. They are commonest round the farms; that is exactly where one would not expect to see them, for they greatly hinder the cutting of the grass. The whole surface is composed of hummocks, usually oval in shape, 3 to 6 feet long and a foot or so high, with very narrow channels between. Professor Thoroddsen considers that they are caused by the phenomena of freezing and thawing which take place in spring, together with the presence of underground ice and the surface cracking which occurs in clay soils. If the soil is sand or gravel resulting in good drainage, or if the surface covering of snow remain well into the spring, then hummocks will not appear. But even if the farmers remove them in the case of clay soils, unless drainage operations be also undertaken, they will reappear in a short time.

The statistics of the upper limits of the various classes of vegetation are very complete and the comments illuminating. It would be most instructive to have these results plotted upon a map, and to compare it

with another map showing the distribution of population. In conclusion, we offer our hearty congratulations to the producers on this happy combination of Danish enterprise with Icelandic knowledge and devotion.

T. S. Muir.

THE RELATIVE DISTRIBUTION OF FIORDS AND VOLCANOES.[1]

By Professor J. W. Gregory, F.R.S., D.Sc.

(*With Diagrams.*)

The Tectonic and Erosion Theories of Valley Formation.—The question whether valleys are due to erosion or to earth movements has given rise to long controversy which, a generation ago, ended in the defeat of the advocates of the tectonic origin of valleys. Their failure to establish their case was probably due to the fact that they claimed too much. Both schools were right in part.

Valleys may be divided into three groups. The first group includes those in which eroding and tectonic agencies have co-operated, the forces of erosion having acted along lines of weakness due to fractures and joints. Such "joint-controlled drainage" is well known in most parts of the world. Such valleys have been wholly excavated by rivers: the structure of the country has only determined the lines along which the rivers have worked. Such valleys are due to erosion: and their attribution to the direct action of tectonic agencies prejudiced the claim for the tectonic origin of others.

The second group includes valleys due solely to excavation along lines due to the slope of the ground and the grain of the country. Earth movements have only affected these valleys by determining the slope of the ground.

The third group of valleys includes those due primarily to earth movements, which caused fissures or depressions that captured the drainage. The rivers may have widened their valleys so as to have destroyed the former walls and buried all traces of the original fracture or fractures; yet the valleys are of tectonic origin, though in time a valley due to denudation may cover the site of the earlier tectonic valley. The existence of tectonic valleys is now generally admitted. The Great Rift Valley of East Africa and the Red Sea, part of the Rhine Valley, and the middle part of the Hoang-ho in China are well-known examples. According to Mr. Bailey Willis the middle Hoang-ho "is a stream occupying a depression produced by normal faulting. It has taken possession of a channel, but has not made one." Those who, like Kinahan in this country, advocated the tectonic origin of valleys were therefore right in part. Their failure was due to their having applied

[1] Based on a lecture given to the Royal Institution, 30th May 1914. References and maps are given in the author's book, *The Nature and Origin of Fiords*, 1914, pp. xvi–542.

to valleys in general an origin which is true only of valleys in special areas. The early advocates of the tectonic origin of valleys did not discriminate between the tectonic valleys of recently faulted and of fiord districts and those due to denudation, which include the large majority of the valleys of the world.

Fiords characteristic of Western Coasts.—One of the remarkable characteristics of fiords which any theory of their origin must explain, is that they are characteristic of coasts facing west. The chief fiord systems, as in Scandinavia, Iceland, Scotland, Patagonia, New Zealand, and the coasts of the Adriatic are all on the western sides of the land, while fiards and fohrden are mostly on the eastern sides. This is part of the wider problem—why the western sides of continents and large islands are higher than the eastern, so that the main river drainage of the world is eastward. This well-known geographical fact is best shown in the two Americas. In Europe the rule holds in Scandinavia and the British Isles; on the mainland of Europe and in western Asia it is obscured by the east to west course of the Alpine-Himalayan mountains. Nevertheless the chief rivers of eastern Europe, from the Danube to the Volga, flow eastward and south-eastward. In Asia the rule holds, except for the rivers of western Siberia, the Indus and Irrawadi; but the rivers of Persia, most of those of India, and those of China, follow the rule. In Africa the watershed is irregular, but the Zambesi, Limpopo, and the Niger flow eastward; the most glaring exception, the Congo, shows by the great falls near its mouth that its present outlet is modern as well as exceptional. Australia appears abnormal in this as in so many other respects; but the old river system of western Australia flowed south-eastward, and two-thirds of the continent has an eastward slope. New Zealand obeys the rule.

As the eastward slope of the land is nearly world-wide, it must be the expression of some widespread ruling principle. It may be explained by the influence of the earth's rotation on blocks of the crust which are moving vertically, or rest loosely on their foundations.

The influence is analogous to the familiar case of the deflection of the trade-winds. Winds blowing toward the Equator lag behind the earth, and are deflected westward. Likewise, if a block of the earth's crust is uplifted it enters a zone which is travelling eastward with a higher velocity than its own; the raised block therefore tends to lag westward. A block which is sinking will press eastward owing to the momentum due to its more rapid eastward movement.

The effects of this influence are therefore very different on the two sides of a continent. On the western side, if the land rises it lags westward, and tends to override the lower ground to the west. A block of land sinking off a western coast presses eastward against the roots of the mountains; and the plastic material forced down below it will tend to flow eastward under the continent and increase its uplift.[1] See Fig. 1, *b*, where the arrows indicate direction of flow.

[1] The effect of suberustal flow in general mountain formation has been advocated by Ampferer (1906), Bailey Willis, Hobbs, and others.

This influence, therefore, tends to raise the western side of a continent, and to tilt the continental block so that it has a long downward slope to the east.

On the eastern side of a continent the conditions are reversed. If the land rise and the sea floor sink, the land presses westward against the mass of a continent: and this pressure tends to close up the joints and cracks and to compress the area, whereas the seaward movement of a western highland tends to open the joints and cracks: slices of land tend on the western side to slide away from the mass of the continent. Hence long fiord straits parallel to the coast are common along the western

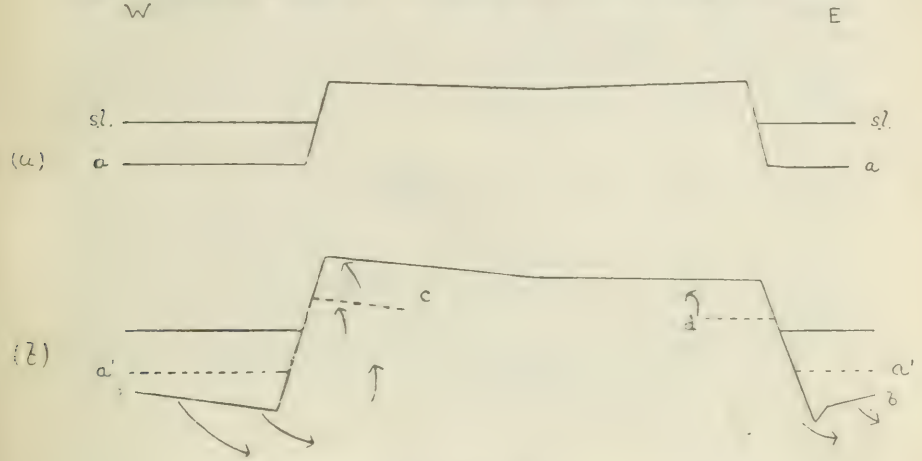

FIG. 1.—Diagram to illustrate the influence of deep-seated rock-flow during earth movements.

(*a*) represents a continental block bounded on each side by ocean basins: *a* the sea-floor: *s.l.* the sea-level.

(*b*) *a'* the original position of the sea-floor, which has sunk to *bb*, while the land has been upraised so that the original sea-level has been uplifted to *cc*. On the western side of the continent the sunken block presses eastward and the deeper material flows under the land while the uplifted area presses westward. On the eastern side the subsiding area presses eastward and the uplifted area westward.

coasts of the world; they occur off the western coasts of British Columbia, Patagonia, Scotland, Norway, and Dalmatia. Such channels might be expected on the rifted coast of south-eastern China, but they do not occur there. Occasional straits occur off eastern coasts, such as Kalmar Sound, off Sweden, and the strait between Saghalin and Siberia; but they and those in the Philippine Archipelago and Queensland are not fiord straits; the Talanta Channel, between Euboea and Greece, and eastern Greenland are almost the only exceptions to the rule that fiord straits are absent from eastern coasts.

It may be objected that in South America the mountain waves of the Andes advanced mainly from west to east; but that fact is quite consistent with the westward lag of uplifted land. The objection overlooks the fundamental difference between the earth movements which

form fiords and those that form chains of fold mountains. The formation of fiords is a surface process which affects rigid rocks. Earth folding is a deeper seated movement, which takes place in the zone where the rocks are plastic owing to the combined effects of heat and pressure, and can therefore flow. The eastward advance of the earth waves that made the Andes was a relatively deep-seated movement; and after the main folding had ceased back-folding westward occurred while the compressed country was resettling (Fig. 2); and during the resettlement after the great Andean folds the uplifting of the rigid surface was accompanied by the westward lag of the raised land and the eastward pressure of the sunken blocks, by which the western coast lands at the two ends of America were rent into fiords.

The tectonic theory, therefore, explains why the western coasts are indented by fiords, while the eastern coasts have long, even shores.

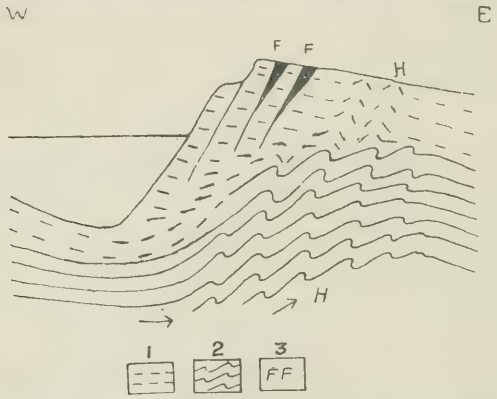

Fig. 2.—Diagram to illustrate tilting and rifting of an upraised western crust block.

1. Rigid rocks. 2. Plastic rocks; the displacement from beneath the sinking sea-floor has folded these beds where they abut against the undisturbed mass to the east of *HH*. 3. Rents due to westward lag of the rising area.

There are, it is true, a few cases of fiords on the eastern coasts, in Greenland, Labrador, and China; but in each of these cases the country consists of a high plateau, which lost its lateral support by the foundering of the land that formerly extended to the east; and in these cases the movement was probably so rapid that the land was rent in spite of its eastern position. Even in these cases there is a tendency for the fiords to develop most where the coast has a western aspect. The inlets of Korea are on the western and southern coasts and not on the eastern; and the shortness of the numerous inlets on the Chinese coast may be explained by this coast being on the eastern margin of the land.

The Distribution of Volcanic Activity.—The principle that rising earth blocks lag westward, and sinking material presses eastward, also helps to explain the distribution of volcanic activity. All the volcanoes of the world are situated to the east of foundered areas; this arrangement may be explained by the material which is forced down-

ward, flowing eastward, and thereby causing volcanic action at the first line of weakness to the east. The active volcanoes of America are near the western coast, of which the former extension has foundered beneath the Pacific. The only volcanoes on the eastern coast of America are in the West Indies, and they are to the east of the foundered basin of the Caribbean Sea. In the Atlantic the volcanic islands from Iceland to the mid-Atlantic chain are all to the east of great depressions. The active European volcanoes are to the east of the foundered Tyrrhenian Sea and of the sunken lands off Greece. In Africa the volcano of the Cameroons is to the east of a sunken area; and the greatest of the extinct volcanoes of eastern Equatorial Africa are to the east of the Great Rift Valley, wherein the latest eruptions in that area have occurred. The Red Sea is bordered by a volcanic chain on its eastern side. The great volcanic festoons of the western Pacific are to the east of foundered basins; active volcanoes occur only on the eastern coast of Asia in the peninsulas of Kamchatka, Korea, and the Malay Peninsula, all of which have foundered areas to the west. In the Eastern Archipelago foundered and volcanic areas are so mixed that this rule is obscured though the facts are consistent with it.

The remarkable feature of the distribution of volcanoes may be explained by the eastward flow of material forced downward by the subsiding crust. This subcrustal movement explains why the volcanic chains on the western sides of the continents are mainly situated on the mainland, while those on the eastern sides occur in island festoons.

THE SO-CALLED MYTHICAL ISLANDS OF THE ATLANTIC IN MEDIÆVAL MAPS.

(Considered as Evidence of Pre-Columbian Exploration toward America.)

By William H. Babcock.

Preliminary.—It seems that the first westward voyages of men were made by the dwellers on the eastern shores and islands of the Mediterranean. What race took the lead may still be uncertain. Theseus and the Minotaur have been taken by the excavations in Crete out of the realm of mere fable into the morning twilight of history, though the legend is admittedly a prodigious distortion. Perhaps we may be justified in viewing similarly the equally early or even earlier stories of Perseus and Hercules, their far westward wanderings, discoveries and conquests. At all events Diodorus Siculus[1] did so, rationalising rather minutely even in the time of Julius Cæsar. He thinks he knows almost

[1] Diodorus Siculus, *Historical Library*, Booth's translation, Book III. chap. iv. p. 195; Book IV. chap. i. pp. 235 and 243.

precisely the courses of these heroes outside of the pillars of Hercules, where they landed, and what they did. Of course we are not prepared to follow him in that: but his conviction tends to reinforce the modern feeling that there are some elements of geographical and historical truth in all this impossible farrago: and certainly no one can deny that men may have sailed out on the Atlantic or up and down its shores in those very early times.

A nearly modern reflection of his identifications, if not his method, may be found in Hakluyt's map of 1587[1] illustrating Peter Martyr, where the Cape Verde Islands appear as "Hesperides, Gorgades vel Medusiae."[2] Above them are Fortunatae Ins. sive Canaria; though Behaim[3] (Globe, 1492) plants Fortunatae Insulae de Majo Bon in the former group. "The Islands of the Sun"[4] (Azores) on Canario's Portuguese map, dated 1502, may not be Homeric or in any way mythical or even ancient; but the "Cassiterides"[5] of Florianus, in the middle of that century, applied to this same oceanic archipelago and to nothing nearer Britain, France, or Spain, take us at least well back of the Christian era to Pytheas and beyond. So inevitably do the old map-makers work into the maps their own speculations, the prevailing popular fancies, and distorted racial memories.

It may be that Phœnician activity in western waters began after the Minoan period, but at least it must have been well developed when it resulted in the foundation of Cadiz, on the Atlantic sea-front of southern Spain, about eleven hundred years before Christ. This city promptly grew into one of the leading marts of the world, able during a very long period to fit out her own fleets and send her commerce everywhere. Carthage, a younger but still ancient sister city within the straits, was not less enterprising, and in time quite eclipsed her, but at last fell utterly, whereas Cadiz, though no longer super-eminent, has continued to exist. Both of these, with the numerous other Phœnician colonies close behind, must have sent out lively and far-ranging explorers. It seems nearly certain that some of these reached Corvo, the westernmost of the Atlantic islands to which Europe can lay any claim, and indeed about half-way across to America, and we cannot tell how much farther they may have sailed in any direction.[6] Their resolution and nautical skill might take them anywhere; but, on the other hand, there is commonly less energy and initiative at the end of a long voyage than at the beginning.

According to Diodorus,[7] the Phœnician discovery of Madeira stimu-

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[1] Nordenskjöld, *Facsimile Atlas*, text, p. 131, map.

[2] "Insulae Hesperidium" are also on the Ptolemaeus Basilicae map of 1540. Nordenskjöld, *Periplus*, p. 117, map 73.

[3] Original in Nüremburg. Kretschmer, K., *Die Entdeckung Amerikas*, Taf. vi. No. 2; Nordenskjöld, *Periplus*; Jomard, *Monuments*, xv. Also copied by Ravenstein, Lelewel, Winsor and others.

[4] Kretschmer, *Die Entdeckung Amerikas*, Taf. vii.

[5] *La Frevi Atlas*, Pl. I.; Nordenskjöld, *Facsimile Atlas*, text, pp. 80, 81; Humboldt, *Examen Critique*, vol. i. p. 296.

[6] Humboldt, A. von, *Examen Critique*, etc., vol. ii. p. 240.

[7] Diodorus Siculus, *Historical Library*, vol. i. chap. ii., at beginning.

lated the Etruscans to consider taking possession of it during their brief ascendancy at sea, and, though this was not carried out, we may suppose them and others to have visited an island so near and so well known. We know that the Greeks voyaged coastwards as far as Scandinavia, and down the African shore beyond the Fortunate Islands; also that Pliny knew the Madeiras as the Purple Islands, while Sertorius at least considered taking refuge in an uncertain Atlantic group which others had visited, and which may have been either these islands or the Canaries; but it cannot be said that the nations of classical antiquity at any time devoted much energy to the remoter reaches of the Atlantic.

Ireland had never been under Roman political control, though it was more or less affected by Roman intercourse in trade. From prehistoric times the Irish had done some sea-roving, as their Imrama[1] attest, and this was stimulated in the early centuries after conversion by an access of religious zeal. There is no doubt that Irish monks had settled in Iceland before the end of the eighth century, and they are recorded as sailing a long way beyond it. There are good reasons for believing that they had also visited most of the islands of the eastern archipelagoes. We cannot suppose that their rather reckless persistency ended there in this period of expansion.

A little later Scandinavians followed along the northern route on which the Shetlands, the Faroes and Iceland made successive convenient halting places, discovered America—that is to say, Greenland, which the Mercator map of 1595 correctly marks Pars America—soon after their colonisation of Iceland near the end of the ninth century, and planted two colonies on the western shore of Greenland in the last quarter of the tenth. Their ruins still remain, a few inscriptions have been found, and diligent spade work has retrieved some industrial products, tools and evidences of daily life. There is no doubt that this occupancy of Greenland continued for more than four hundred, possibly for quite five hundred, years.

Less than a quarter of a century after their first landing, Norse Greenlanders became aware—as was inevitable—of the mainland American coast not very far away. The most authentic account says that this knowledge came from Leif Ericsson, who was driven by stress of weather to another shore when returning from Norway to Greenland. Afterwards Thorfinn Karlsefne, with 160 people in three ships, endeavoured to colonise this coast.[2] The attempt failed, owing to the hostility of the natives at one point and dissensions among the settlers at another. But they made the acquaintance of the typical American coastline of sand and dune, which stretches from the end of Cape Cod to the end of Florida, with only two slight interruptions near Newport and New York city, and one isolated outlying northern reach on the eastern front of

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The Voyages of Bran, Maelduin, St. Brandan, Hui Corra and Snedgus. Alfred Nutt, "The Voyage of Bran," *Revue Celtique*, vol. ix. pp. 14, 447; vol. x. p. 63; vol. xiv. p. 37. *Blackwood's Magazine*, vol. xxxix., "Anglo-Norman Trouvères," etc.

[2] *The Saga of Thorfinn Karlsefne—otherwise of Eric the Red.* Reeves' *The Finding of Wineland the Good* supplies facsimile pages of MS. in full, also of variant versions with Icelandic print and English line for line translation, also full notes.

Cape Breton. They had observed and named the three zones of country —that of treeless barrenness, that of forest-clad wilderness, yielding little natural sustenance but game, and that of greater warmth and abounding fertility—which must always have characterised this shore. They had probably noted the strong ocean streams of Grand Manan and Grand Manan Channel, and made the shore of Passamaquoddy Bay their main abiding place in the New World, with an incidental voyage around Cape Breton into the Gulf of St. Lawrence, and a longer sojourn on some landlocked bay of southern New England, where grapes and wild rice grew abundantly. The evidence for the more specific of the above statements has been fully presented in *Early Norse Visits to North America*, and need not be recapitulated here. There is a general concurrence of investigators, with very few dissentients, as to the discovery of Labrador, Newfoundland, and Cape Breton Island, with some exploration of the coast below. The knowledge thus gained was not forgotten, for the Icelandic annals[1] (nearly or quite contemporary) record a visit to that island of a ship which had made the journey from Greenland to Markland. This occurred but a few years after Hauk Erlendsson copied into his compilation the standard version of the Saga of Eric the Red, thus providing the earliest extant manuscript of that important narrative. It is generally known as the Saga of Thorfinn Karlsefne, from a name afterwards affixed by a distinguished collector, and embodies with other matter the story of his voyage.

The Arabs of the west had remained inert in nautical matters for a considerable time after their conquest of the Iberian peninsula; but afterward they took up strenuously the work of exploration. Edrisi is their most celebrated name in geographical knowledge, and indeed no other geographer of any faith or race can be named as his equal in the twelfth century. He relates,[2] about 1154, the extraordinary voyage of the Magrurin, who sailed out from Lisbon at some undefined earlier time, sworn to attain the end of the Sea of Darkness. They apparently penetrated to the border of the Sargasso Sea and reached as their farthest point some island, perhaps one of the Canaries, which was not very far from the shore of Africa, along which they returned toward home.

The Italians of the thirteenth century, and especially the Genoese, undertook similar exploration, and temporarily occupied one or more of the sea islands, besides probably leaving the Italian names which the fourteenth-century maps disclose on most of the others. A few of these names still persist, though others gave way to fifteenth-century Portuguese substitutes. They also sent forth about 1285 an expedition to seek the east by way of the west under the brothers Vivaldi, who unfortunately vanished at once with all their men.[3] Long afterward a man

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[1] Reeves, *The Finding of Wineland the Good.* Nansen, *In Northern Mists.* Olson, *Orig. Nar. Early Amer. Hist.*, vol. i., "Voyages of the Norsemen."

[2] *Géographie,* Jaubert's trans., vol. ii. p. 27. Humboldt, *Exam. Crit.*, vol. ii. p. 237, gives summary.

[3] D'Avezac, M., *Discoveries of the Middle Ages,* etc., p. 23. Cf. Humboldt, *Exam. Crit.*, vol. ii. p. 234.

claiming to be a survivor, or a survivor's descendant, was found by another expedition on the coast of Africa. Like their predecessors already mentioned, we can say of the thirteenth-century Italians only that they certainly covered the eastern half of the Atlantic.

The Bretons had shared in the Irish faith-voyages, Saint Malo appearing in tradition sometimes as a companion of Saint Brandan, sometimes as an imitator or competitor. Also, their fishermen pushed out from an early time to remote regions of the sea. Some of their latest achievements in the years shortly following the great voyage of Cabot are commemorated by the island below Newfoundland, which still bears their name. An earlier experience, based on different evidence, will be dealt with subsequently.

The Venetian brothers, Antonio and Niccolo Zeno, are said to have served Earl Sinclair of the northern islands and made a voyage with him to Greenland about the year 1400, he being incited thereto by the report of a fisherman, who professed to have spent many years in regions south-west of that colony, which could only be other parts of America. The narrative was accompanied by a map which exercised great influence during a long period on those that succeeded it. But it is generally agreed that both map and story, if not wholly spurious, have been so seriously transformed in a post-Columbian attempt at reconstruction that it is unsafe to rely upon them.[1] We may suppose it to be true that these Venetians and Earl Sinclair sailed in the northern seas about the time stated, perhaps with the purpose of exploring westward ; but, if so, it does not appear that anything was effected.

This brings us down to the rise of Portuguese nautical endeavour, which became so conspicuous under the direction of Prince Henry the Navigator, and included at last the remarkable discoveries of Vasco di Gama in India and Cabral in South America, besides aiding to inspire the great and eminently successful undertaking of Columbus. Its first unquestioned achievement was the rediscovery of Madeira and the Azores. But it seems to have begun earlier than is generally recognised.

Excepting the Norsemen—Gunnbiorn, Eric Rauda, Leif Ericsson, and Thorfinn Karlsefne—and the much later and more illustrious Christopher Columbus, no European is known to have reached any part of America before 1493. But many features of very early maps at least point that way. There is a fascination in following these elusive shapes into the twilight of the history of the shores and seas. Any earnest effort to expand or fill out the human record, bringing a vanished past into the circle of light again, must have some lasting value : and experience in other fields of research encourages the hope that these dubious matters may yet be made more certain and definite.

The Island of Brazil.—On the map of South America the word Brazil fills a great space, covering a country about as large as the United

[1] Major, R. H., *The Voyages of the Venetian Brothers Zeno.* Lucas, F. W., *The Annals of the Voyages of the Brothers Zeno.* They state in full opposing views as to these alternatives.

States of America, marked off from all neighbours by its Portuguese language, a living monument to early post-Columbian discovery. To many minds the name will convey no other geographic meaning. Yet it is neither native nor Portuguese, but almost certainly a loan word from Irish Gaelic to Portuguese in a roundabout way.

It is true that a prevalent hypothesis, supported by great names, derives it from a root (*brazil* in mediæval Latin) common to divers European languages and indicating the red glow of hot coals, the queerly strained reference being to red dye-wood, which had certainly come to be called brazil-wood long before the discovery of America.[1] The people of the Middle Ages delighted in this striking colour, and brazil-wood, being abundantly found in the far East, was one of the chief inducements to seek for a westward way.

When John Cabot, seeking Brazil, reached on that course in 1497[2] the front of the land-wall of the St. Lawrence Gulf, his rather random hope, as expressed at second-hand in contemporary correspondence, was that "silk and brazil-wood" might yet be found there. From the same source of information we learn that the region which he had coasted so far was believed to be a part of Asia; in other words, a continental, not an insular, Brazil—a sound inference, though referred to the wrong continent.

On the Atlante Mediceo, or Laurenziano-Gaddiano map of 1351,[3] and the Pizigani map of 1367,[4] Terceira, chief of the Middle Azores, is named Brazil in the aberrant forms Brazi and Brazir respectively; and that name still lingers locally on its Mount Brazil. This island formerly abounded in dye-woods, according to D'Avezac;[5] and it may have had a further supply of red-dye material in orchilla, the famous seaweed which mainly prompted the conquest of the Canaries and, as some say, gave Pliny's name, "The Purple Islands," to Madeira and Porto Santo. If either were abundant, there would be ample reason for the association of the word Brazil with red dyes, even long after the imputed source had been lost sight of, and the word for most people had ceased to have a geographical meaning. The question is—did the island derive its name from red dye-wood material, or the red dye-wood from the name of the island where it was plentifully found? The balance of probability seems to incline to the latter: for there was already another, a greater and more celebrated Brazil, after which this of the Azores might be named in imitation and emulation.

The Italian map of Dalorto,[6] 1325, and the Catalan map of Dulcert,[7] 1339—believed, with no great certainty, to be by the same man, who must thus have changed both residence and surname—show a great

[1] Humboldt, *Exam. Crit.*, vol. ii. pp. 219, 222. Not accepted by Kretschmer, *Entdeckung*, etc., chap. iii. sec. vi. p. 214. See Nansen, *In Northern Mists*, vol. ii. p. 229.

[2] *Orig. Nar. Early Amer. Hist.*, vol. i., "Voyages of Cabot."

[3] Fischer, *Sammlung*, v.

[4] Jomard, *Monuments of History and Geography*, plate x[1].

[5] D'Avezac, *Discoveries of the Middle Ages*, etc., p. 35.

Monaghi, A., Monograph read before the Third Italian Congress, 1898, separate with map.

[7] Nordenskjöld, *Periplus*, plate viii.

circular Brazil, like the disc of the full moon, west of southern Ireland, where certainly dye-woods would not be expected except by those whose minds were especially prepared in advance: nor would red embers be at all likely to suggest a name in such a case.

That name, in fact, has taken many forms: Brazil, Brazi, Brazir, Brasil, Brasill, Bresil, Bersil, Buxelle, Brazyle, Brisilye, O'Breasil, Old Brazille, and doubtless others not instantly called to mind, but all referable easily to that Breasail—compounded perhaps of Breas (prince) and ail (noble), to choose two of their divers meanings—which is said to survive still in conservative peasant use, and is quoted as the name of a pagan demigod in Hardiman's *History of Galway*, from one of the Four Masters, collating in the sixteenth century very much more ancient material.

Moreover, the first syllable of Breasail seems to have been much in vogue as a name for mythical persons in remote pagan times. Mr. Westropp informs me in a record letter: "Breas, one of the Tuatha De Danaan, was the first who addressed the Firbolg representative on the invasion of Ireland by his, Breas', race, and they exchanged lances. The Tuatha De Danaan had alleged that they came out of the sky on the wind; the later scribe interprets this as in ships." Again, "Bress, son of Elatha, one of the Fomorians, was accepted as king by the Tuatha De Danaan because their own king, the god Nuatha Silver Hand, had lost his hand in the battle of Mag Tured." He gives also in outline the curious story of Bress and the Sham Dun Cows from the Book of Leinster. Furthermore, "Brecan,[1] whose original name was Breasal, was son of Eochy Boill dearg, the first Christian King of Thomond, who was baptized by St. Patrick about 434. Brecan shared Aran with St. Enda, *circa* 480-500. They evangelised parts of modern Clare and Aran. Enda is said to have been consulted by Brandan before his voyages. Aran is presumed to be a centre of information for the outer sea." St. Bresal's grave is believed to be on this spot, where the tradition of Brazil most confidently survives.

It does not at all follow that the great western land, commonly mapped as a round island opposite the Blaskets, was named after any of these heroes of mythology and history. But a name of royal and miraculous associations might very well be applied to a great geographic discovery and acquisition, in an extravagantly admiring spirit, and with highly complimentary intentions. It testifies to a congratulatory, celebrating, and eminently appreciative mood. Its subsequent reappearance, by copying or echoing, to indicate lesser, but still admirable, prizes of exploration, is more easily thinkable than that red dyes, unaccountably associated with the region, should suggest red embers by a strained analogy, and that these in turn should supply a regional geographic name. It matters little whether the special meanings above stated for the syllables of Breasail were present in the minds of those who first named the new country, or of those who mentioned or mapped

[1] *The Carew MSS.*, last vol. p. 6, represents Finn as appointing three commanders, including in their names MacBressell, Bressell, and Brassell, to guard different parts of the Irish coast.

it in later years. Beauvois[1] long ago made nearly the same analysis of the word, choosing other meanings, but they are hardly less commendatory. That such was the view currently taken of this "island" sufficiently appears from the inscription on Fra Mauro's map of 1459,[2] "Questa Isole de Hibernia sot dit fortunato," which ranks it with those counted even supernally blessed. It does not appear that a like encomium was ever passed upon Terceira or any other derivative Brazil, though at first they must have shared the reflected glory in some degree.

Apart from Irish legend, the name did not begin with 1325, having been fully established in Mediterranean commercial use before the end of the twelfth century, though at first in a relation and with a specific meaning not at all to be expected. In Muratori's[3] celebrated collection of mediæval Italian documents and data there occurs a copy of a commercial treaty between the people of Ferrara and those of a neighbouring town or small state, which presents a list of commodities, the subjects of stipulation. In this, with wax, furs, incense, indigo and others, we find included "grana de brasile" (*grain* of Brazil). The same is also literally repeated in a quite independent "charta" of the same volume dated five years later.

Muratori's comments do not help the matter; for he first inquires what grain this may be, in evident bewilderment, and then suggests that it is an instance of error and that dye-wood was intended. But who would mistake grain for wood? An error of that sort twice occurring, with years between the instances, and in documents where every item was sure to be closely scrutinised by interested parties, with prompt protest in case of any misleading or ambiguous term, seems improbable.

A more natural, and indeed the only explanation, is that the phrase means what it says: *i.e.* some kind of grain which had come to be known as of Brazil. Here is an open door to further investigation, but thus far though "grana de Brasile" is not literally repeated, the items of the next century or two restrict the entry to the final word without defining in any way what sort of article or substance this may be. Thus, Capmany's *Memorias Historicas of Barcelona*[4] copies thirteenth-century tariff lists of port dues and the like, one of which in 1221 names "Carrega de Brazil"; another of 1223 names "carga de brazil," and another somewhat later, "cargua de brazil," the spelling varying as in the fourteenth and fifteenth century maps, after the easy-going fashion of early times, but the word being plainly the same. As before, the other commodities named are too heterogeneous to define the article at all. Carrega, carga, and cargua only convey to us that it was something to be put up in enclosures, hence presumably a somewhat comminuted or at least not bulky product, which might well be grain, or might not.

A grant of murage rates to the city of Dublin[5] in 1312 uses the

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[1] Beauvois, E., *L'Élisée Transatlantique*, p. 3 (Breas=grand, ail=prodigious).

[2] Kretschmer, *Entdeckung*, etc., Tafel iii.; Fischer, *Sammlung*; Santorem's *Atlas*, last plates.

[3] Muratori, L. A., *Antiquitates Italicae Medii Aevi*, vol. ii. pp. 891 and 894.

[4] Capmany, D. Antonio, *Memorias Historicas*, etc., vol. ii. pp. 3, 4, and 5.

[5] Westropp, T. J., *Early Italian Maps of Ireland*, etc., p. 393.

words "de qualibet centena de brasile venali," which have no reference to wood of any kind, but merely show that "brazil" thus used had come to mean some taxable article of merchandise in Ireland and elsewhere.

In the absence of further explanation, which probably yet will be supplied, one would like to suppose all these brazils of commerce to be probably the same: but this does not necessarily follow, for we have India ink and India rubber—not to hunt about for less familiar parallels—and it is quite conceivable that the geographic word might come to be used alone in either sense. If the "brazils" of Barcelona and Dublin above cited should be shown to be wood or other dyeing material, we should still need to be informed about Muratori's rather bewildering grain.

The region referred to, of course, cannot be the South American Brazil, which was discovered and named about 200 years later. It does not seem likely to be Terceira, for though there was probably some knowledge of the Azores in some quarters of Europe during that (the twelfth) century, as indicated by both the text and maps of Edrisi's *Geography* in all surviving versions, he does not know nor use the word, and our evidence ends with him. There is also nothing to bridge the interval between the commercial brazil of 1221 and 1223 and the map Brazil of 1325, except the items above given, which add no geographic information. But as this Brazil, west of Ireland, is the first to occur on the maps, and as the same name in Irish personal use has been traced even into prehistoric times, we seem justified in holding this Brazil to be (more likely than any other) the one which gave name to the grain—at least until some adverse evidence shall appear.

(To be continued.)

GEOGRAPHICAL NOTES.

Europe.

Geographic Aspects of the War.—Professor D. W. Johnson is contributing to the *Bulletin* of the American Geographical Society a series of articles with this title, of which the first, dealing with the western area, appears in the March issue. The paper is illustrated by a block diagram of the Paris Basin and some good reproductions from photographs, and discusses somewhat fully the topographical reasons which induced Germany to violate the neutrality of Belgium, in spite of the greater length of this route into France as compared with the more direct line *via* Metz. The paper is clear and interesting, and the series as a whole should constitute a valuable contribution to war literature.

Russian Equivalent Tables.—We have received a copy of a useful series of tables for converting Russian units into those used here, just published by the Central Translation Institute, Ltd., at 265 Strand, London, at a cost of 1s. net. The tables are well and clearly arranged, and in addition to their prime importance to business men carrying on

Russian trade, will be found useful to the general public now that Russian bulletins are being scanned with so much care and Russian books so widely read.

Lecture on Serbia.—On March 31 a meeting on behalf of the Serbian Relief Fund was held at the Synod Hall, the use of the Society's Rooms being kindly granted by the Council, and that of the Pillar Hall by the Corporation of Edinburgh. Dr. Marion Newbigin lectured on Balkan Problems, with special reference to Serbia and her desire for an access to the Adriatic Sea, and Miss Ruth Raeburn showed a fine series of lantern slides taken from original photographs of Serbian subjects. Dr. John Horne, F.R.S., was in the Chair, and Mr. Will. C. Smith, K.C., proposed the votes of thanks. As the result of the meeting a sum of £43 was sent to the Serbian Relief Fund in London.

Asia.

Exploration in Central Asia.—The Royal Geographical Society has, according to the *Times*, received a report from Sir Aurel Stein from Turfan, dated November 1914, giving some account of the work of his official expedition to Central Asia from April to November.

The expedition started in April from Tunhuang, where it had halted for a short time to recover from its trying winter campaign in the Lop-nor desert, between Turfan and the northern boundary of Tibet. Sir Aurel Stein paid another visit to the cave temples of the Thousand Buddhas, near Tunhuang, and was richly rewarded. He followed the wall for close on 250 miles eastwards. Along almost the whole of this distance the wall, with its watch-towers and small military stations, had been built across what already in ancient times was absolutely sterile desert. The wall itself was a very remarkable construction, built of carefully secured fascines of reeds or brushwood, with layers of clay or gravel between them.

As the expedition proceeded beyond the sharp bend made by the Su-lo Hu valley the physical difficulties greatly increased, largely from want of water, but there was reward in the ample finds of ancient records on wood, of furniture, and implements of all sorts, which were brought to light at the ruined watch stations. Conclusive evidence shows that all these had been left behind by the Chinese soldiers, who, during the first century before and after Christ, had kept guard over the frontier.

Sir Aurel Stein was very much impressed by the engineering skill which was required to adapt the defensive line of the wall to different local conditions. In May he started on a fresh line of investigation, the object of which was to follow the united course of the rivers of Suchou and Kanchou down into Southern Mongolia, and to explore what ancient remains might be found along it and in its terminal delta.

While Sir Aurel Stein carried out his explorations to the northwards, his surveyor, Lal Singh, proceeded in another direction to carry out surveys of practically unexplored regions. The observations made

upon the hydrography of this now practically desert region are full of interest. Traces of extensive irrigation works, which for some reason had been abandoned long ago, were found. The ruined town of Khara-Khoto was examined, and the position and remains proved that this must be Marco Polo's "City of Etzina," where in ancient times travellers bound for Karakoram, the old Mongol capital, had to lay in victuals for forty days in order to cross the great desert, where there was no habitation or baiting place.

Here Sir Aurel Stein collected many valuable relics—Buddhist manuscripts and prints, many fine stucco relievos and frescoes, miscellaneous records on papers, and household utensils. Finds of coins, ornaments in metal and stone, etc., were abundant. Everything pointed to the conclusion that the abandonment of the settlement must have been caused by difficulties about maintaining irrigation. In the course of these journeys Sir Aurel Stein met with an unfortunate accident which hampered him very considerably, though after a short rest he was able to continue the work of the expedition.

Altogether, before the expedition arrived at Turfan, many valuable additions were made to the previous work of the leader, both archæological and geographical. Around Turfan there are many ruined sites of Buddhist times to which Sir Aurel Stein proposed to devote a few months, while his surveyor would find ample work in mapping the extensive and little-known desert ranges of the Kuruk-tagh between Turfan and Lop-nor.

Polar.

The Fate of Stefansson.—According to the *Times*, Mr. Hazen, Minister of Marine, in the Canadian House of Commons on March 27, expressed the opinion that the explorer Stefansson, in regard to whom no news has been received, has been lost in the Arctic, with his two companions. The Government, he stated, was doing all that was possible to find the missing men, and three steamers now in the Arctic would be sent in search as soon as the ice breaks up.

The Anglo-Swedish Antarctic Expedition.—It is announced that the Anglo-Swedish Antarctic Expedition, under the leadership of Professor Otto Nordenskjöld, which was to have sailed in August next, has been postponed till the end of the war. Some account of the objects and plans of this expedition was given here in vol. xxx. p. 326.

General.

Obituary.—We regret to record the death, under tragic circumstances, of Mr. Henry A. R. Chancellor, who was a foundation member of the Royal Scottish Geographical Society, and sat for some years upon its Council. Mr. Chancellor was present at the lecture on Serbia on Wednesday afternoon, March 31, and left Edinburgh the following morning for Wanlockhead, with the intention of climbing Green Lowther. The exertion of the walk apparently proved too much for him, for his

dead body was found subsequently near the Enterkin Pass. Mr. Chancellor had a wide and thorough acquaintance both with Scotland and with the continent of Europe, through which he had travelled extensively on foot. He was an excellent pedestrian, a great hill-climber, a fine linguist, and a man of wide interests.

Variation in Length of Glaciers.—The annual report on the variation in the length of glaciers appeared as usual at the end of 1914, the figures given referring to 1913. No very definite fact as to general advance or retreat emerges from the report as a whole, but there seems to be evidence that the arrested retreat which has prevailed for some years continues, and in a few cases there has been advance. The last statement is, for example, true of both the Grindelwald glaciers and of some of those of the Eastern Alps. Professor Brückner says, "The increase in the number of advancing glaciers is undoubted, and the retreat of the glaciers in the East Alps has diminished, even if it remain true that most of the glaciers are still going back."

Royal Geographical Society's Awards.—The Royal Geographical Society's awards for 1915 were made at a recent meeting of the Council, and will be presented at the anniversary meeting on May 17. The Founder's Medal has been awarded to Sir Douglas Mawson for his conduct of the Australian Antarctic Expedition of 1911-14, which has achieved highly important results in several departments of science. We may note further that Sir Douglas Mawson and the leading members of the Australasian Antarctic Expedition have been awarded the Polar Medal by the King. The Patron's Medal has been awarded to Dr. Filippo de Filippi for his great expedition to the Karakoram and Eastern Turkestan in 1913-14. The Victoria Research Medal has been conferred upon Dr. Hugh Robert Mill, who for many years has done a great deal on behalf of geographical research. Other awards have been decided as follows :—The Murchison Award to Captain J. K. Davis, who commanded the S.Y. *Aurora* during the time of the Australian Antarctic Expedition, when he proved to be a seaman and commander of exceptional merit. The Back Grant to Mr. C. W. Hobley, C.M.G., for his valuable contributions to the geology and ethnology of British East Africa. The Cuthbert Peek Grant to Mr. A. Grant Ogilvie for the good work he has already done in geographical investigation and research. The Gill Memorial to Colonel Hon. C. G. Bruce, M.V.O., who for twenty years has been exploring the Himalayas.

The Royal Geographical Society has removed the name of Dr. Sven Hedin from its list of Honorary Corresponding Members. Dr. Hedin has also been excluded from the Imperial Geographical Society of Russia.

Secretaryship of Royal Geographical Society.—The following statement appears in the *Geographical Journal* for April :—"As already announced, Dr. Keltie will, on March 31, retire from the Secretaryship of the Society, which he has held for twenty-three years. He is succeeded both in the posts of Secretary and Editor by Mr. Arthur R. Hinks, F.R.S. It has been arranged, however, that Dr. Keltie shall

remain on the Society's staff as Joint Editor until Midsummer 1917. In any case the retention, for a period, of Dr. Keltie's unique experience of the affairs of the Society and its relations with geographers throughout the world, would have been greatly to the benefit both of his successor and the Society. In the stress of present circumstances, while so much of the time and energy of the officers and staff of the Society, and of Mr. Hinks in particular, are given up to work entrusted to them by the War Office, the Council feel that they are particularly fortunate in being able to retain Dr. Keltie's presence and services."

We note also that it is announced that the Geographical Society of Paris, while resolving to make no awards this year, has decided that there shall be one exception to this rule, and has awarded Dr. Keltie its Gold Medal, as it was felt that Dr. Keltie's retiral from the Secretaryship of the Royal Geographical Society could not be allowed to pass unnoticed.

Commercial Geography.

Completion of Congo-Tanganyika Railway Line.—We learn from the *Times* that in the middle of March last the railway line from Kabalo to the shores of Lake Tanganyika was completed. The result is to link up, partly by water and partly by rail, the mouth of the Congo and the lake. The Congo is navigable by ocean-going steamers as far as Matadi, 85 miles from its mouth, whence a line 260 miles long was completed in 1898, at a cost of about 2¾ millions sterling, to Stanley Pool (Leopoldville), navigation on this part of the stream being impeded by rapids. But from this point for nearly 1000 miles the river is navigable to Stanleyville, whence another line, to avoid the Stanley Falls, runs to Ponthierville. Higher up the river, now known as the Lualaba, there is another stretch of line necessitated by the rapids above Nyangwe, and finally, after another length of navigable stream, the line now completed runs along the Lukuga River from Kabalo, on the Lualaba, to Albertville, on Lake Tanganyika.

The terminus of the German line from Dar-es-Salaam, completed a year ago, is on the opposite or eastern side of the lake, about 94 miles distant, so that the Kabalo-Tanganyika line may be said to complete the chain of communications across the African continent.

Extension of Nyasaland Railway.—The extension of the railway running between Port Herald, in Nyasaland (the southern terminus of the Shire Highlands Railway), and Chinde (a point on the northern bank of the Zambesi) was opened for traffic on April 1. The line forms complete railway communication between the Zambesi and Blantyre, the capital of British Nyasaland. It is sixty-one miles in length, and crosses a tributary of the Zambesi by a steel bridge of thirty-eight spans, over a third of a mile in length. The chief importance of the line is that it facilitates transport between Nyasaland and a navigable point on the Zambesi. At Port Herald, the interior terminus of the section, the river is only navigable for a few months in the year, while at Chinde the river is navigable all the year round.

EDUCATIONAL.

The Yorkshire Summer School of Geography.—We are informed that this school will hold its annual course this year in Sheffield. The course will be organised by the University of Sheffield and will deal principally with the north of England, and more especially Yorkshire, from a regional standpoint. It will include field-work, practical work, and excursions. A course of lectures will also be given on the countries of the war, and there will be evening lantern lectures on various geographical subjects. Special attention will be paid to map-reading and the interpretation of maps, and a large selection of maps, including war maps, will always be on view.

Sheffield affords an admirable centre for geographical study, with the Pennines actually within the city boundary on the west, and the limestone regions of Derbyshire within easy access, and on the other hand the great industrial activity of the city and the region to the east and north. The lecturers will include Dr. R. N. Rudmose Brown (University of Sheffield), Mr. J. M'Farlane (University of Manchester), Mr. P. M. Roxby (University of Liverpool), Dr. W. G. Smith (East of Scotland College of Agriculture), and, it is hoped, Professor Patrick Geddes. The Vice-Chancellor of the University, Mr. H. A. L. Fisher, will give the opening address, and Mr. H. J. Mackinder, M.P., has promised to deliver a lecture.

Certificates will be granted to students whose attendance and work is satisfactory. The fee for the whole course is £3. Applications for tickets should be made, with remittance, to the Registrar, the University, Sheffield, to whom cheques and postal orders should be made payable. A lodgings list is being prepared, price 3d. post free.

Geography at Oxford.—We have received copies of the First Annual Report of the Committee of Geography at the University of Oxford, a Committee which was constituted towards the close of 1913. The report covers the period from 1913 to 1914, and gives a list of the members of the Committee. It goes on to say:—"Among the first duties of the new Committee was to consider the finance of the School. The existing grants to the School from the University and the Royal Geographical Society expired with the Trinity Term, 1914. The Royal Geographical Society has renewed its grant of £400 a year for two more years, and the University has continued its grants to the School of Geography until December 31, 1915. The University also reappointed the Reader in Geography for five years from the Michaelmas Term, 1914; and the Committee reappointed the present staff of the School to December 31, 1915. The Junior Demonstrator, Mr. A. G. Ogilvie, M.A., Magdalen College, was granted a year's leave of absence, as he had received the A. K. Travelling Fellowship. Mr. Ogilvie is now with his Battery. The Committee is glad to report that the Clothworkers' Company, who were approached by the President of the Royal Geographical Society, have voted a sum of £500 towards the Geographical Endowment Fund. This sum will be paid in five annual instalments.

The thanks of the Committee and of the University have been given to the Clothworkers' Company. The number of students working at Geography in 1913-14 was 41 (23 men and 18 women), though all of them did not spend three Terms at the School. Four of these students were doing Research work, 6 were preparing for the Civil Service Examination, 19 for the Diploma, 7 for the Certificate, and 5 were taking practical classes and reading with a tutor for other purposes."

Full accounts are also given of the work of the school during the period covered, and of the progress which has been made in completing the equipment, upon which a sum of £2720 has now been spent. The Vacation Course was held as usual in August last, despite the outbreak of the war, and of the 180 students who entered, 160 were able to complete the course. The original programme was carried out with only slight modifications.

NEW BOOKS.

ASIA.

A Journey to Java. By M. M'Millan. London: Holden and Hardingham, 1915. *Price 7s. 6d. net.*

This is a book of a lady's impressions of a journey by sea from Sydney, N.S.W., to Sourabaya, calling at Port Moresby, New Guinea, also at Thursday Island and Port Darwin, in Northern Australia, and then following the tourist-route through Java. While not appealing especially to the geographer, the book is pleasantly written, and, without suggesting the guide-book, contains a deal of information about the beautiful island of Java and its people. Perhaps the most attractive chapters are those which describe visits to Djokakarta, a native state of mid-Java, with its famous water castle, the residence of a former sultan: and to Boro Boedor, the wonderful Buddhist hill temple, the existence of which in the midst of the jungle was accidentally discovered by a party of British engineers in the year 1814. This was at the time of the British occupation of Java, during the Napoleonic wars, when Sir Stamford Raffles was governor of the island. He had the earth and tropical growth cleared away from the buildings, and so brought this marvellous piece of work to the light of day. On the recession of Java to its former owners, the work of restoration was continued under Dutch archæologists, and the temple is now in a fairly perfect condition. Miss M'Millan quotes from Alfred Russel Wallace's *Malay Archipelago*, where he says, "The amount of human labour and skill expended on the Great Pyramid of Egypt sinks into insignificance when compared with that required to complete this sculptured hill temple in the interior of Java."

In a special chapter Miss M'Millan gives a short description of the Dutch colonial methods of government, with a brief reference to the "culture system" which led to so many evils after its adoption by General Van den Bosch in 1833. The system consisted in forcing the natives to cultivate "rich crops," such as sugar, indigo, tea, quinine, tobacco, and various spices; the produce being taken over by the government at prices which ensured a handsome profit to the colony. The neglect of the ordinary rice crops at length led to famine among the Javanese, and the forced cultivation is now confined to coffee. The author points out that the original "culture system," though admitted to be primarily an evil, led to

an ultimate good, for in no other way could the easy-going Javanese have been induced to grow anything beyond the amount of rice sufficient for their own daily needs. "Compulsory sowing and planting have made Java what it is, *i.e.* a veritable Garden of Eden, with the most luxuriant vegetation of any island in the world."

The Excavations at Babylon. By Robert Koldewey. Translated by Agnes S. Johns. Pp. 335, with 255 Illustrations and Plans. London: Macmillan and Co., Ltd., 1914. *Price* 21*s. net.*

For thirteen years excavations have been regularly conducted on a large scale by the Germans on part of the ancient site of Babylon, and the result of the work is here recorded in a condensed form by the architect in charge, R. Koldewey. Although as many as from 200 to 250 workmen were employed daily during summer and winter for all these years, the exploration of the mounds is still incomplete, and much remains to be done. Excavations have been confined to the remains on the east bank of the Euphrates, though at one time the total area of the town was bisected by the river. Herodotus gave Babylon a circumference of 56 miles, Ctesias of 42 miles, which Koldewey further reduces to about 11 miles. The town wall, which excited the admiration of the ancient world, consisted of two walls, each about 23 feet thick, and separated by a space of about 40 feet. A series of towers at intervals gave additional strength to the inner wall, but its height cannot at present be determined.

The most northerly mound, known as Babil, was not excavated, but the natives have dug into it in search of bricks. Judging from the courts and chambers they have laid bare, and from inscribed bricks used in their construction, it is practically certain that here stood a palace of Nebuchadrezzar.

About a mile and a quarter to the south lies a very spacious mound, known as the Kasr, and here the excavations were begun in 1899. On its eastern side the Procession Street, running north and south, was opened up and produced the finest specimens of art discovered during the whole course of the exploration. The street led to Ishtar Gate and to the temples of Nin-makh and Marduk (Bettis). Babylonian architecture in the sixth century B.C. depended for its effect almost entirely upon mass, and any decoration was confined to the surface of the walls. Columns, friezes, sculptured pediments and mouldings were unknown, but an excellent effect was sometimes produced by covering the walls with glazed and coloured tiles, on which lions and other animals were modelled in low relief. On the side walls of Procession Street the employment of coloured tiles for this purpose was found in its perfection. Advancing towards the Ishtar Gate from the north, the spectator saw on each side of him a procession of lions, each about 6½ feet long, admirably moulded, and advancing in the same direction as himself. The bodies were white, with a red or yellow mane, which contrasted with the blue background.

The walls of the Ishtar Gate are still 40 feet high, and covered with brick reliefs of bulls and dragons, while above them are several courses of coloured enamelled tiles, including a row of white rosettes with yellow centres. The excavation of the adjoining temple of Nin-makh gave for the first time a ground plan of a Babylonian temple of the sixth century B.C. The work undertaken on the east side of the Kasr exposed a series of courts and chambers which belonged to another palace of Nebuchadrezzar. It includes a remarkable vaulted structure, below the level of the ground, which the author believes to be the basement of the famous Hanging Gardens of Babylon. To the west of the palace lay another built by Nabopolassar, and to the south a smaller building of the Persian period.

About 550 yards south of the Kasr is the northern side of a quadrangular depression, which the author considers to be the precincts of E-temenanki or the famous Tower of Babel. The foundations of the buildings and of the wall forming the enceinte were opened up, but what remains of the tower seems to have been left unexplored. Koldewey cannot bring himself to believe that the tower was erected in seven terraces, each smaller than the other, though an inscription discovered by George Smith gives the dimensions of each stage with a total height of 300 feet. On the Hill of Amram, lying south of the above, at a depth of about 70 feet, the remains of E-sagila, or the temple of Marduk, were discovered. Only part of it could be excavated, but shafts were sunk at intervals, so that its square plan could be made out, and inscribed bricks proved that the site was that of E sagila. Of the six pavements the lowest belonged to the time of Esarhaddon, the middle ones to Sardanapalus, and the two upper ones to Nebuchadrezzar. Two other temples, one of an unknown god and the other dedicated to Ninib, were unearthed on mounds lying to the east of Amram. On the Hill of Merkes, lying about 550 yards east of the Tower of Babel, foundations of a very early date were discovered, and above these, at various levels, later foundations proved the site had been inhabited for a great number of centuries without intermission. At the lowest levels tablets were found of the immediate successors of Hammurabi (2250 ; about 10 feet higher the inscribed tablets recorded kings living from 1300-1400 B.C., while the latest belong to the Persian and Greek periods. At the lowest level the dead were wrapped in reed matting, or were roughly surrounded by bricks. At a higher level pot-burials had come into use. The body, in a flexed position, was fitted into two large pots, which were then cemented together at their mouths by means of bitumen. Koldewey still maintains that he found cremated interments with pot-burials at Fara, though, according to King, the cremation was an accident due to the total destruction by fire of the settlement. In other pot-burials from Fara and Surghul the bodies were uncremated, and the size of the double pots is sufficient to show they were not designed as cremation urns. The graves were not well furnished, but a few swords, knives, lanceheads, and arrow-heads of bronze were found, and ornaments such as necklaces and fibulae. The mention of "palaeolithic flint saws" must be a misprint for "saws of neolithic aspect."

One of the last discoveries was a Greek theatre to which a palaestra was attached, but no work of art was disclosed during its excavation. The ground plans and illustrations, some of them in colour, are numerous and good. But there is an uncorrected misprint on page 204, line 9, where "east" must be read "west" and in line 10 for "western" read "eastern."

AMERICA.

The Lower Amazon. A narrative of Explorations in the little known regions of the State of Para, on the Lower Amazon, with a record of Archaeological Excavations on Marajó Island at the mouth of the Amazon River, and observations on the General Resources of the country. By ALGOT LANGÉ, Author of *In the Amazon Jungle*. With an Introduction by FREDERICK S. DELLENBAUGH. With 109 Illustrations and 6 Maps. New York and London : G. P. Putnam's Sons, 1914. *Price* 10*s.* 6*d. net.*

The most interesting chapters of this book are those describing a visit to a previously unknown tribe of Indians living up the Moju river, south of Para. With only a few days at his disposal the author made good use of his time, and

has put on record a considerable amount of information as to the manners, customs and appearance of the savages, besides securing several excellent photographs and compiling a vocabulary of their language. His researches on the Island of Marajó have also provided results of great value, and he has brought back for future study a very large selection of pieces of ancient pottery. Mr. Langé enlarges upon the blighting effect of the rubber industry on the inhabitants of the State of Para. It is not that the workers are ill-treated, but the high price of rubber a few years ago caused fortunes to be easily made, and led to the neglect of other more stable sources of revenue. Now that rubber has fallen in price a kind of hopeless lethargy seems to have seized upon the people, which augurs badly for the future. The high import duties upon machinery greatly retard the development of industries, and altogether prospects in the Lower Amazon are not bright unless the policy of the government should change.

GENERAL.

A Pilgrim's Scrip. By R. Campbell Thompson. With Illustrations and a Map. London and New York: John Lane, 1915. *Price* 12*s.* 6*d. net.*

A publisher's note informs us that the author has recently been gazetted as a captain on the Staff of the Indian Army, an appointment which is probably due to his knowledge of the Near East. A perusal of the volume undoubtedly supports this claim. Captain Thompson is obviously familiar with Asia Minor, Syria, and Mesopotamia, and has visited Tripoli and the western shore of the Red Sea, and of all he discourses with that ease which is the outcome of intimate personal experience. His profession is that of archæologist, and, in pursuit of what he calls at the close the "great game," he has resided at Mosul and journeyed to Behistun in Persia. It was as a sportsman that he visited the Sinaitic peninsula and Tripoli, while in what he calls the Sudan, but what is really the semi-desert Red Sea shore north of Sawákin, he acted as assistant-surveyor. Native life, incidents of travel, scenery and fauna, all are brought in to fill the canvas with a most attractive picture. But Captain Thompson has chosen to clothe his thoughts in archaic language. Doughty, whom he mentions once, almost succeeded in burying his knowledge of Arabia under a mass of verbiage. We remember overcoming with difficulty our initial repugnance to his artificial style, and gradually becoming entranced in his narrative; but that sort of thing cannot be done twice. We hope, then, that Captain Thompson, when he gives us another volume, as we trust he will in due time, will remember that we are in the twentieth century. The value of the book from a geographical point of view is enhanced by the illustrations; the sketch-map is adequate; and there is an excellent index.

The Oil Conquest of the World. By Fred. A. Talbot. London: William Heinemann, 1914. *Price* 6*s. net.*

Mr. Talbot has compiled many useful and interesting books on industrial subjects such as railways, steamships, and lighthouses. This is not the least important subject he has epitomised, and he has in these pages brought together in a popular way a mass of varied information about oil and things pertaining to its production, manufacture, distribution, and uses. Mr. Talbot is evidently not an oil specialist, and has given us an intelligent outsider's view of almost every aspect of the subject without too much technical detail or too much attention to any one department of a vast and increasingly important branch of human

industry. The author begins in Chapter i. with the Coming of Oil and its distribution, and at page 9 he makes a geological slip, which should be corrected, when he speaks of the basins or depressions of the strata as "anticlines" and the humps as "synclines," the opposite of which is the reality. Another misstatement occurs on page 10 when he says that oil is not apparent in the British Islands, "which owe their existence primarily to volcanic activity." The absence of oil, as well as the existence of these islands, has nothing to do with volcanic activity, but is due to other causes.

The methods of searching for, drilling wells, refining, and conveying the oil to the market, and the remarkable oil fountains and oil fires that have occurred, are all touched on in turn, and the skill and excitement of the oil prospector's existence, with the abundant failures and difficulties he has to meet, are well described. Among the many sources of oil the Scottish oil shale industry has a chapter to itself, which is appropriate. Oil from whales and various kinds of fish, and the products of animal and mineral oils, are described in the later chapters. Among these, users of margarine will find much to reassure them. A chapter is devoted to nut oil or margarine and its manufacture from cocoa nuts and milk on the best sanitary methods. The milk is used merely to give the nut oil a taste of butter, but does not enter into the composition of the resulting margarine. This substance, or something indistinguishable from it, can however also be made from fish oil, which is obtained nearer home in large quantities.

In his enthusiasm for his subject the author is apt to exaggerate the oil question, and occasionally makes statements that are not quite warrantable. At page 6 he says, "The North American Continent . . . . is not only an enormous subterranean oil tank, but is a gigantic gasometer as well." This is rather a "gassy" observation for a sober writer. Large parts of America are quite devoid either of oil or gas, and there is little or no prospect of finding oil in the vast northern territory of Canada. At page 144 occurs another totally unwarranted assertion, "The world could roll along very comfortably without coal: it would not miss it if all the supplies were cut off to-morrow. But if the oil resources of the world were extinguished the whole advance of civilisation would come to a dead stop. . . . The unique value and indispensability of oil lies in the fact that, not only can it be made to fulfil every purpose for which coal at present is employed, but can be utilised for a host of other applications as well." We have not yet learned how the author proposes to smelt iron with oil, and without coal and coke it is to be feared the world would not roll along nearly so comfortably as Mr. Talbot would have us suppose. Besides this it must be remembered the supplies of coal are far larger than the stores of mineral oil, and after all is said and done it is probable the old black diamond will outlive all the oil wells that have ever been or are likely ever to be discovered.

In spite of a few exaggerations and slips, the book forms a most interesting and readable contribution to industrial literature. The letterpress is illustrated by about eighty excellent photographs, including such subjects as oil wells, conflagrations, oil fountains, whales, tank steamers, and various views of the Pumpherston Oil Company's works in Midlothian.

BOOKS RECEIVED.

Black's Travel Pictures: The British Empire. Selected and edited by Robert J. Finch, F.R.G.S. Large 8vo. Pp. 24. *Price* 10*d. each.* London: A. and C. Black, Ltd., 1915.

Woman's Mysteries of a Primitive People: The Ibibios of Southern Nigeria. By D. Amaury Talbot. With 44 Illustrations from Photographs. Royal 8vo. Pp. viii + 252. *Price* 10*s.* 6*d. net.* London: Cassell and Co., Ltd., 1915.

Mount McKinley and Mountain Climber's Proofs. By Edwin Swift Balch. Royal 8vo. Pp. 142. Philadelphia: Campion and Co., 1914.

The Unexploited West: A Compilation of all the Authentic Information available at the present time as to the Natural Resources of the Unexploited Regions of Northern Canada. By Major Ernest J. Chambers, Corps of Guides. Royal 8vo. Pp. xv + 381. Ottawa: Department of the Interior, Railway Lands Branch, 1914.

Aboriginal Siberia: A Study in Social Anthropology. By M. A. Czaplicka. With a Preface by R. R. Marett. Demy 8vo. Pp. xvii + 374. *Price* 14*s. net.* Oxford: Clarendon Press. 1914.

The Romanisation of Roman Britain. By F. Haverfield. Third Edition. Demy 8vo. Pp. 91. *Price* 3*s.* 6*d. net.* Oxford: Clarendon Press, 1915.

The Surface of the Earth: Elementary, Physical, and Economic Geography. By Herbert Pickles, B.A., B.Sc. Crown 8vo. Pp. xii + 170. *Price* 2*s. net.* Cambridge: University Press, 1915.

Village and Town Life in China. By Y. K. Leong, LL.B., B.Sc., and L. K. Tao, B.Sc. With a Preface by L. T. Hobhouse. Crown 8vo. Pp. xi + 155. *Price* 5*s. net.* London: George Allen and Unwin, Ltd., 1915.

Flora of Jamaica: Containing Description of the Flowering Plants known from the Island. By William Fawcett, B.Sc., F.L.S., and A. B. Rendle, M.A., D.Sc., F.R.S., F.L.S. Vol. III. *Dicotyledons.* Demy 8vo. Pp. xxiv + 280. London: British Museum (Natural History), 1914.

A History of Persia. By Lieut.-Col. P. M. Sykes, C.M.G., C.I.E. In 2 vols. With Maps and Illustrations. Demy 8vo. Pp. vol. I. xxvi + 544; vol. II. xxii + 565. *Price* 50*s. net.* London: Macmillan and Co., Ltd., 1915.

Report on the Administration of Coorg for the Year 1913-1914. Mercara, 1914.

Report on the Administration of Assam, 1913-1914. Shillong, 1915.

Statistical Abstract for the British Empire in each Year from 1899-1913. London, 1915.

Hindustani Musalmans and Musalmans of the Eastern Punjab. (Handbooks for the Indian Army.) Calcutta, 1914. *Price* 1*s.* 4*d.*

Royal Societies Club: Foundation and Objects, Rules and Bylaws, List of Members. London, 1914.

Colonial Reports (Annual).—Southern Nigeria (825); Swaziland (830); Imperial Bureau of Entomology (834); St. Vincent (835); St. Lucia (836); Straits Settlement (838); Cayman Islands, Jamaica (839). London, 1915.

Diplomatic and Consular Reports (Annual).—Trade of Petrograd (5328); Pernambuco (5412); Abyssinia (5422); Dakar (5423); Bunder Abbas (5425); Nicaragua (5427); Bangkok (5428); Thessaly (5429); Bushire (5430); Bahrein Islands (5433); Nice (5435). London, 1915.

Publishers forwarding books for review will greatly oblige by marking the price *in clear figures, especially in the case of foreign books.*

THE SCOTTISH

GEOGRAPHICAL

MAGAZINE.

THE BALKAN PENINSULA: ITS PEOPLES AND ITS PROBLEMS.

By Marion I. Newbigin, D.Sc. (Lond.)

(*With Coloured Orographical Map and Sketch-Maps.*)

In a very early issue of this *Magazine* (vol. ii., 1886), Mr. A. Silva White, then Secretary of the Society and joint-Editor of its *Magazine*, published an article, illustrated by maps, on "The Balkan States." In the course of this paper the author says, "Of Turkey in Europe, therefore, very little is left," and again, "The Turks are everywhere giving way, and their dominion is retreating before the rapid march of civilisation." If these statements were true some twenty-eight years ago, much more are they true at present. Further, not only have there been important political changes in the peninsula, but, thanks especially to Serbian and Austrian geographers, we know much more about its structural peculiarities than was known then. Finally, the fact that both in the north and in the south-east the region is involved in the great European War, and that great readjustments of political frontiers are almost certain to take place at its conclusion, make it highly desirable that a knowledge of the geography and of the peoples of the peninsula should be as widely spread as possible. The occasion thus seems ripe for a new article on the subject.

The Structure of the Peninsula.

Orographically the peninsula has always been regarded as very complex, but the general principles laid down by Suess, applied in detail by such investigators as Cvijić, Philippson, etc., have cleared up many doubtful points, and enabled us to grasp at least the broad outlines of its structure.

The essential features are shown on the structural map which forms

Fig. 1. We see here that the centre of the peninsula is occupied by an old land surface, composed of ancient rocks, which has a generally triangular shape. The apex of the triangle lies near Belgrade on the

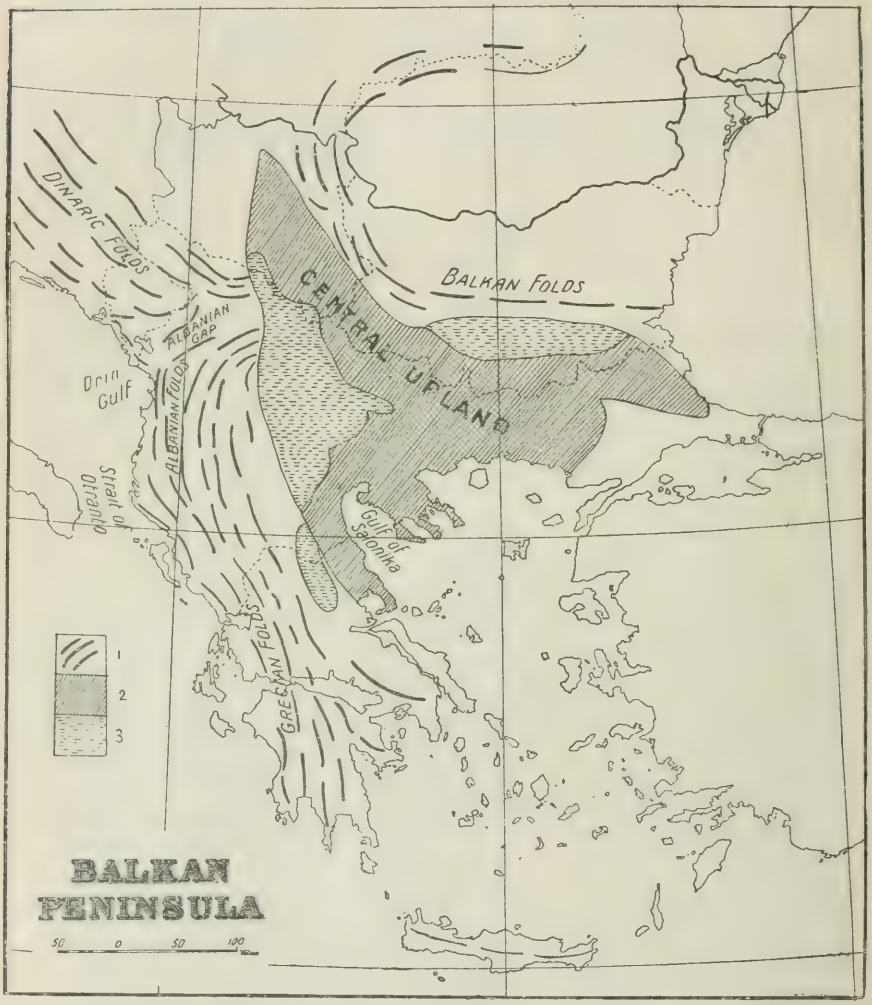

Fig. 1.—Structural Map of the Balkan Peninsula. 1. The Folded Areas. 2. The Central Core or Rhodope Upland. 3. The Transition Zones. (Based partly upon Cvijić.)

Danube, its base extends from the Black Sea to beyond the Gulf of Salonika. To this central core the name of Rhodope may be given, by extension from the Rhodope Mountains, which include its highest points (rising to about 10,000 feet). This central upland is the oldest part of the peninsula, and forms the resistant core round which mountain folding has taken place.

Leaving aside, however, for a moment the marginal mountain folds, we must note that the Rhodope mass was once continuous across the present Aegean Sea into Asia Minor, where rocks of similar character occur. Thus the central part of an old continental mass has foundered beneath the ocean, foundered unequally and incompletely, so that the eastern coast of Greece is characteristically interpenetrated by inlets, fringed by long peninsulas, while the Aegean itself is island-besprinkled, and its coasts well supplied with ports.

This then is the first structural feature of the Balkan Peninsula, that it has a central continental core whose southern end is sunk beneath the waves of the Aegean. The second important feature is that this central core is margined by young folded mountains, earth waves which have as it were broken against that central core, as sea waves break upon the rocks of the shore.

These folded mountains fall naturally into two groups: (1) the western chains, consisting of the Dinaric Alps and their continuations, and (2) the Balkans, themselves apparently a continuation of the Transylvanian Alps.[1] Let us look first at the western chains. In the north-western extremity of the map we see indicated the direction and distribution of the folds forming the Dinaric Alps proper, and note that they have a north-west to south-east direction, and approach the coastline nearly. It is a commonplace of physical geography that in Dalmatia there has been recent subsidence of the coast, so that the valleys of the coastal chains have been flooded to form the characteristic Dalmatian "canals," while the ridges form the equally characteristic peninsulas, which run parallel to the shore.

If, however, we follow the fold-lines towards the south-east, we note that at a certain point they swing round towards the north-east, the swinging corresponding in a general fashion to a peculiar notch in the coastline, called variously the Drin Gulf and the Gulf of San Giovanni di Medua. Beyond that Gulf the coast, which previously trended from the north-west to the south-east, like the mountain folds, runs for a time due north and south, this north-to-south area forming the sea front of Albania. Beyond the promontory formed by Cape Glossa, within the Straits of Otranto, the coast re-acquires the south-easterly direction, which it keeps more or less till the extremity of the peninsula is reached.

Now let us turn from the coastline to the mountain folds. The north-to-south section of the coast corresponds in direction to the Albanian folds, save where, near the Drin Gulf, these also swing round to the north-east, parallel to the similar swing of the Dinaric folds. The result is to leave, between the two parallel mountain ridges, which form the North Albanian Alps and the Shar Mountains respectively, a relatively low area, which we have called the Albanian Gap. (See Fig. 3, p. 290.) The actual gap is less obvious than it appears on the map, for certain folds, called by Professor Cvijić the resistant folds, do not swing round with the rest, but continue to follow the coastline, and thus render

[1] Cvijić denies that the Balkans are structurally a continuation of the Transylvanian Alps, but the statement in the text represents the more generally accepted view.

communication between the inner part of the gap and the sea relatively difficult. But to this point we shall return, for this Albanian Gap is politically of very great importance.

If we follow to the south the fold-lines shown on the map, we see that in Greece they re-acquire the south-easterly direction, till, towards the extremity of the peninsula, they swing round to the east and are seen, for example, in Crete, as having an almost east-to-west direction. Here, however, we may leave them.

Now let us look at the north-eastern region of Fig. 1. Here we have indicated the fold-lines which form the Transylvanian Alps, and we see how they seem to bend round, cross the Danube at the Iron Gates, and finally, turning again to the east, form the Balkan range, which sinks down towards the Black Sea. A point which is scarcely suggested on this map, but one to which we shall return, is the fact that the Balkan folds have in their centre a long tectonic valley, the Inter-Balkan valley, which is bounded to the north by the Balkans proper, and to the south by the lower chain of the Anti-Balkans, a sort of shadow of the main chain.

Finally, as the third element in the peninsula, we have two belts, lying between central upland and marginal mountain chains, which Professor Cvijić calls the transition zones. The central upland consists, as we have said, of old beds, especially schists and other crystalline rocks; the marginal mountains consist of young, soft deposits, among which limestones are very largely represented. The transition zones have certain characters in common with both areas. They resemble the central core in the absence of folding, and, to some extent, in the character of their rocks; but though they show no folding, properly speaking, parallel lines of faulting occur, equivalent to those which are also present in the mountain region. The special feature of the transition zones, however, is the presence of many basins or depressions, apparently due to faulting, and usually elongated in the direction of the mountain folds. These depressions occasionally, as in parts of southern Macedonia, still lodge lakes. More generally the lakes which once filled them have drained away, leaving behind soft deposits which give rise to fertile soil. It is because of these fertile basins that the transition zones are especially fit for human occupation, better fitted than the uplands of the core, which are mostly covered with forest or pasture, better fitted also than the marginal mountains, where the prevalence of limestone gives rise often to a stony, nearly waterless, "karst" type of country. The basins, however, present certain well-marked peculiarities of drainage, which have played a not unimportant part in bringing about the political difficulties of the peninsula. To the political conditions we must turn next.

Political Boundaries before the 1912-13 Wars.

Prior to the last territorial readjustments, those which followed the Balkan wars of 1912-13, the peninsula was divided politically as indicated in Fig. 2. Let us correlate briefly these political boundaries with the structural features which we have just described. In the first place we

have to emphasise the fact that the northern boundary of the Balkan region is formed by the Danube, then by the Save, then by the Kulpa, a small tributary of the latter river, and finally by a line drawn from the Kulpa to the Adriatic in the vicinity of Fiume. (See the Coloured Map.) Thus Roumania is outside the peninsula. In point of fact, however, as the sketch-maps suggest, there is evident a tendency among

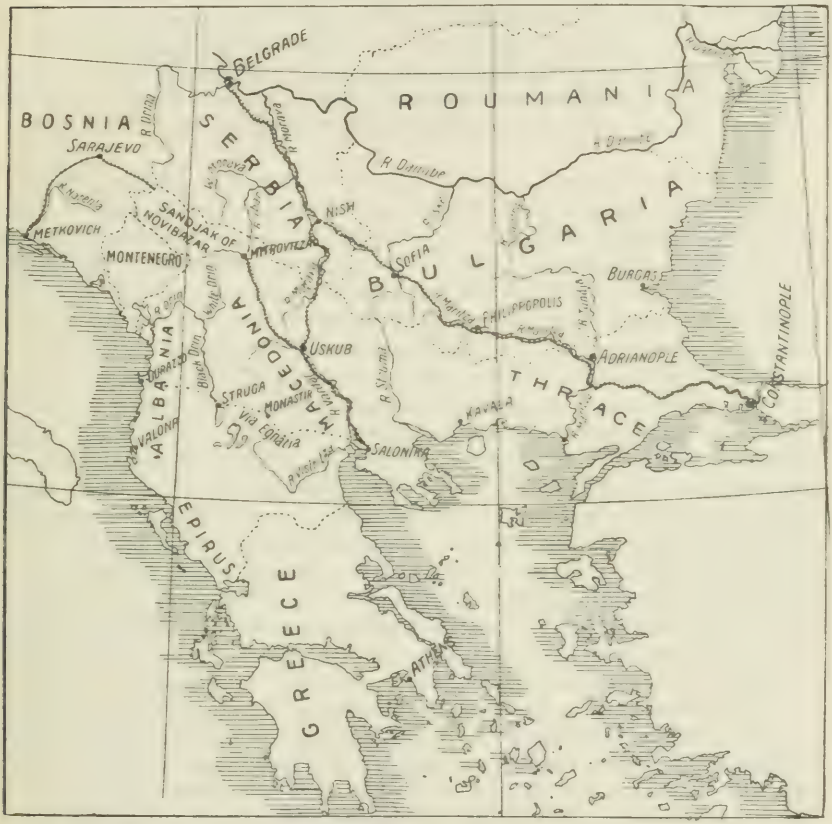

FIG. 2.—The Political Frontiers before the 1912-13 wars, and the chief railways. The parts of Turkey are marked separately as Epirus, Albania, the Sandjak of Novibazar, Macedonia, and Thrace. The frontiers after 1913 are shown on the Coloured Map.

cartographers, chiefly no doubt for practical reasons, to regard Bosnia as a part of Austria, and thus to draw the north-western frontier of the peninsula further south than in the geographical definition given above.

The next point to notice is that the peninsula falls naturally into two parts, a northern quadrilateral, which in climate and in products is Central European or even Eastern European in character, and a truly peninsular extremity, deeply interpenetrated by the sea, and therefore

almost everywhere Mediterranean in its products as in its climate. Before the 1913 settlement most, but not the whole, of this peninsular extremity formed the Kingdom of Greece, which in its people and in their characteristic occupations offers a very marked contrast to most of the rest of the peninsula. One of the difficulties in drawing satisfactory political lines in the region, however, is due to the fact that the Mediterranean climate, with the related social polity, extends along the coasts of the "continental" segment of the peninsula. This is especially true of the Adriatic, where the orange extends—if not in very good specimens—up to the mouth of the Narenta, and the olive considerably beyond this point. Both of these are trees which bring in their train a very special mode of life, quite different from that characteristic of the interior of the peninsula.

Till 1913 the northern part of the truly peninsular region, and the southern segment of the northern quadrilateral, were included in the heterogeneous Turkish Empire. On the map the different parts of Turkey in Europe are indicated. Thus we see that the western coastal region was divided into Epirus (now Greek) and Albania (erected into a short-lived independent state in 1913). Inland is an extensive region to which the name of Macedonia is usually given, though its northern part is also called Old Serbia (it now forms part of "New Serbia"). We shall use the name Macedonia here in a quite general sense as including the land round the Vardar valley, extending eastwards to the region of the port of Kavala. To the north-west of Macedonia is a very interesting strip of territory, the Sandjak of Novibazar, which, till 1913, separated Montenegro from Serbia, and till 1908, the date of the annexation of Bosnia-Herzegovina, was in the military occupation of Austria. The map shows a point of great interest: the railway which extends from Salonika northwards towards Bosnia stops at Mitrovitza, close to the southern boundary of the Sandjak, while similarly the railway which extends in Austrian territory from Sarajevo southwards stops at the northern border of this no-man's land.

The remainder of the Turkish Empire in Europe in 1912 we may regard as falling into Thrace, the province which extends from the vicinity of Kavala to Constantinople, and consists chiefly of the southern slopes of the Rhodope upland, and the steppe region behind Constantinople. The fall of the land is such as to cut off, to a considerable extent, the fertile plains of Bulgaria, which lie between the northern slopes of the Rhodope upland and the southern slopes of the Balkans, from the Aegean, but two river valleys, upon which even at this point we must lay stress, permit of intercommunication. These are the Maritza valley, to the east, which offers an easy but circuitous route to the sea, and the Struma valley, giving a direct but not very easy passage almost from Sofia, the capital of Bulgaria, to the shore of the Aegean.

Summing up, we may say that till 1913 Turkey in Europe consisted of a part of the western mountains, forming Epirus and Albania, the southern slopes of the Rhodope upland with a steppe region to the east (Thrace), and a belt of land, with small fertile basins, lying between the coastal chains and the western border of the upland (Macedonia).

A comparison of Figs. 1 and 2 will show that this means that Cvijić's western transitional zone lay almost wholly in Turkish hands. Again, and this is a very important point, the Turkish possessions were so arranged as to cut off Serbia and Bulgaria alike both from the Adriatic and from the Aegean, as well as from Greece.

The cutting off Serbia from the Adriatic was completed by the fact that Dalmatia, as well as Bosnia-Herzegovina, were, as they are still, in Austrian possession, and though Montenegro had a minute segment of coast, the fact that till 1913 she was separated from Serbia by the Sandjak prevented the possibility of any arrangement between the two powers, even if the physical conditions had permitted the construction here of a useful line of communication from Serbia to the Montenegrin coast.

The rest of the peninsula was included in Serbian and Bulgarian lands. Montenegro is a little block of mountain land, lying immediately to the north of the Albanian Gap, and, as we have seen, all but cut off from the coast by the jealousy of neighbouring powers. Serbia consisted of the north-western slopes of the Rhodope upland, separated from Roumania and Bulgaria by the bending round of the Transylvanian Alps into the Balkans, but with no natural division line between it and Austrian territory in Bosnia, and none except the Save-Danube furrow between it and the plains of Hungary. Bulgaria, which till 1908 was still under some vestige of Turkish authority, consisted of the long northern slope of the Balkans from the crest to the Danube, of a transition zone with fertile plains lying between the Balkans and the northern slopes of the Rhodope, and of those slopes themselves to the crest. But the fact that her frontier ran across the valley of the Maritza, to the north-west of Adrianople, and that that great river turns sharply southwards to the Aegean, gave her necessarily a political interest in Thrace, while the other fact that the Struma valley leads from near her capital southwards across Macedonia to the same sea, gave her also an interest in Macedonian affairs. Serbia's exclusion alike from Adriatic and from Aegean was too purposeful not to arouse in her a passionate desire to burst the bonds in which she had been placed, so that both states were politically in a condition of unstable equilibrium. But the political ambitions which led to the 1912-13 wars cannot be understood without some reference to the lines of communication within the peninsula.

River Valleys and Lines of Communication.

It is a geographical commonplace that, as a general rule, coastal plains and river valleys are the tracts along which main lines of communication tend to run in regions of high average relief. Now one of the most striking features of the peninsula, as the general map shows clearly, is that coastal plains are virtually absent, save on a very small scale. They are almost necessarily absent along practically the whole of the western coast, on account of the marginal mountain chains there. The fact that the central continental core once extended across the Aegean makes them virtually absent also round the shores of that sea. Finally

though at first sight we might expect to find a considerable plain along the Black Sea coast, yet because there has been recent elevation here, the rivers tend to turn away from this shore (cf. the curious northward bend of the Danube, and the southern bend alike of Tundja and Maritza) so that this coast also tends to repel alike settlement and roads.

If we turn next to the river valleys, we note at once that they possess frequently a feature which limits very greatly their usefulness as routes either for roads or for railways. This feature is the presence, in very many cases, of a sudden elbow turn on their course. We have spoken of the Maritza and the Tundja, both of which show this peculiarity. Note also on Fig. 2 the course of the Drin. One might suppose at first sight that it is a river which would facilitate communication between the coast and the interior. But, as the map shows, while its lower course appears to offer a natural route inland, the two main streams (the White and Black Drin) of which it is composed run almost at a right angle to the lower valley. Compare also the river Narenta further north and the Vistritza in southern Macedonia. A careful study of the large map would yield many other examples, but those given are sufficient to illustrate the point, that only rarely can either road or rail follow a river valley for any considerable distance in the peninsula.

Many of the rivers, especially those of the western region, have another peculiarity, which does not show on maps of these scales, but which is an enormous obstacle to communication. This is the fact that, owing to the frequency of limestone rocks, and in part to earth movements, the streams tend to flow at the bottom of deep canyons, where it is difficult, sometimes almost impossible, to construct either roads or railways. The Narenta is an example of a river valley where this difficulty has been got over, for both road and river follow for a time its deep limestone gorges. The Drin is an example of one where as yet no attempt has been made to grapple seriously with the problem, and the only line of communication here is a track which climbs laboriously over the uplands.

Coastal plains scarcely exist; river valleys in the most general case can only be followed to a limited extent by road and rail; the country is one of high mean relief—how then is communication possible? One answer is that in much of the northern quadrilateral, especially in that part which till 1913 was Turkish, means of communication are about as bad as they can possibly be. The old Roman roads (Fig. 6) have fallen into disuse: railways, their modern representatives, are few and far between (Fig. 5), especially in the western section. But, and this is a very important point, certain river valleys, or, it is perhaps more accurate to say, certain structural valleys, partially occupied by rivers, afford admirable means of traversing the peninsula, as distinct from opening it up. It is one of the many geographical anomalies of the peninsula, anomalies which help to account for its retarded political development, that while it is extraordinarily difficult for the independent states to find good lines of communication leading from within outwards to the sea, yet, on the other hand, their territories are open to invasion as few other countries are.

The sketch-map which forms Fig. 2 is intended especially to show the two main lines which have often permitted alien armies to sweep through the peninsula, which have rendered the task of forming centralised states comparable to that of a man who would seek peace and seclusion in the middle of a frequented highway. We see from the map that these two lines, both now followed by railroads, run respectively from Belgrade to Constantinople, and from Belgrade to Salonika, the last town being the great southern entrance or gateway of the peninsula, as Belgrade is its northern and Constantinople its eastern entrance. Thus the direction of one line is generally north-west to south-west, of the other almost north to south. Let us consider each in a little detail.

Both routes start from Belgrade at the junction of Danube and Save, and cross the hilly country near the river to enter the Morava valley. This valley is then ascended to the town of Nish, where the two routes diverge. The Constantinople route follows for a time the valley of the Nishawa, a tributary of the Morava, passing the town and basin of Pirot. It then crosses a watershed at the Dragoman pass (height about 2400 feet), and enters the basin of Sofia, thus taking advantage for a time of the Isker valley, a river which flows to the Danube. Beyond Sofia the railway enters for a short distance the most westerly part of the long Inter-Balkan valley, that hollow which lies between the Balkans and the Anti-Balkans, and is not traversed by one continuous river. Beyond, the Vakarel pass is crossed at a height of about 2450 feet, in order that the railway may make its way into the upper Maritza valley. After crossing the pass the road, but not the railway, passes through Trajan's Gate, a narrow gap long regarded as the boundary between East and West. Once into the Maritza valley it might be supposed that the way was clear, but at the town of Adrianople the river takes a sudden bend to the south, and afterwards turns again to the south-west, to enter the Aegean not far from the Gulf of Saros. But just at the point where the turn to the south-west occurs, the valley of the Ergene, a considerable tributary of the Maritza, approaches the main stream, though the rivers do not unite till a point considerably beyond this. This Ergene valley is taken advantage of in order to permit the railway to be directed upon Constantinople.

The details which we have given are of somewhat minor importance; they have been inserted as illustrations of the general statement that lines of communication in the Balkan Peninsula can rarely follow river valleys for more than a limited distance, and to suggest the further point that, in marked contrast to countries like our own, where no considerable earth movements have occurred in recent geological times, we find here valleys which are antecedent to the rivers which occupy them. In other words some of the valleys of the peninsula, *e.g.* the Inter-Balkan valley, are not due to the erosive work of rivers, but to tectonic causes. The limits of this paper do not permit of a full discussion of the rivers of the peninsula, but it may be noted that there is reason to believe that the Maritza once ran towards Constantinople, along a line which in part corresponds in direction to the present railway line. Similarly, the Tundja is the "beheaded" and "captured" segment of a river which

once ran through the Inter-Balkan valley to the Black Sea, which it entered near the present port of Burgas. The whole series of changes in the courses of the rivers here seem to be associated with the sinking of the Aegean, a process which gave great erosive power to the rivers to the south, and enabled them to encroach upon the drainage areas of those lying further to the north.

We have to turn next to the second great line of communication through the peninsula, that from Belgrade to Salonika, which we left at Nish. The railway here ascends the Morava valley, crosses a low and peculiar watershed between this river and the Vardar, and so reaches

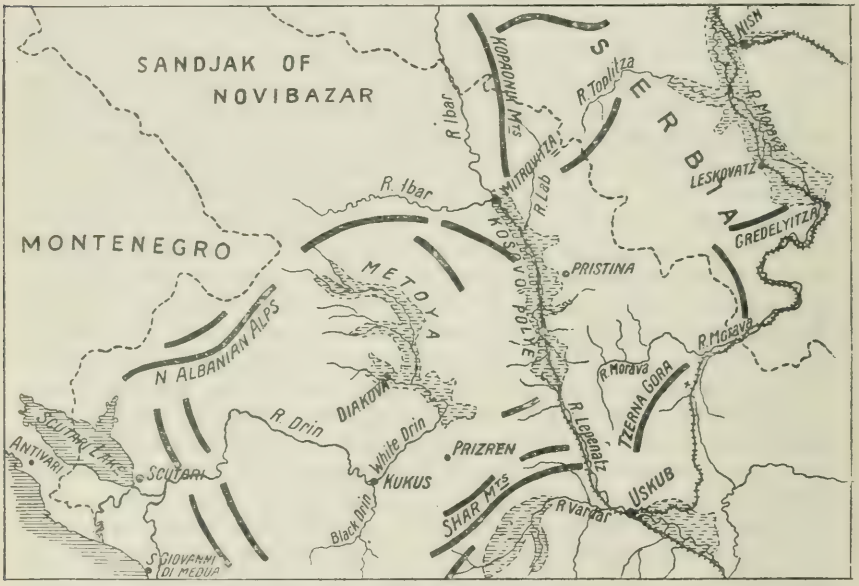

Fig. 3.—Sketch-map of N. Albania to show the Albanian Gap. The position of two parallel tectonic valleys is indicated, one occupied successively by the Ibar, the Lepenatz, and the Vardar, and the other by a part of the Morava.

Uskub, whence it descends the Vardar to Salonika. Thus at first sight the conditions here seem simpler than in the preceding case. In detail, however, there are certain marked anomalies of drainage, which demand careful consideration. If we look first at the generalised sketch-map which forms Fig. 2, we note—a point also shown in the folded map at the end of this article—that there are indications of two long tectonic valleys in this part of the peninsula. One is indicated by the Morava valley from its confluence with the Danube to a point beyond Nish, the other stretches from the Western Morava up a part of the course of the river Ibar, and, after running through a region of confused drainage, is continued by the Vardar valley to Salonika. The most interesting part of both valleys is shown in greater detail in the diagrammatic sketch-map which forms Fig. 3. This map indicates by shading the elongated

depressions which we have already mentioned as especially characteristic of Macedonia, and attention may be drawn to that very curious one which forms the Kosovo Polye, also known as the Amselfeld or Plain of the Blackbirds. This plain is of great historical interest, owing to the many battles which have been fought there, but our special point is that towards its southern end there is between tributaries of the Ibar, and thus of the Morava, and tributaries of the Vardar, a watershed so low that in wet weather the streams interlace. The importance of this may be gauged when we recollect that the water-parting is that between the Danube, and thus the Black Sea, on the one hand and the Aegean on the other. It is perhaps unnecessary to emphasise the fact that such a condition as that of an indeterminate watershed, lying within a basin, is not only a highly peculiar fact, but that it is certainly a recent condition. It must mean that recent changes have taken place in the drainage, changes whose full effects have not yet had time to make themselves felt.

We cannot enter into a general discussion of the drainage here and its history; the special point is again to emphasise the fact that rivers which behave in so anomalous a fashion as those of the peninsula are not of great assistance as a means of opening up the land, and further that the ordinary strategic rules, that it is undesirable to divide rivers between two states and that water-partings form good frontiers, are not applicable here. In point of fact in the case of these Macedonian rivers water-partings are often low, sometimes ill-defined, and the ravines through which many of them pass not infrequently give a better frontier than their headwaters. Further, without going into full details, it will be obvious to the geographer that the conditions in, *e.g.* the Kosovo basin, can only be explained on the supposition that the normal development of river valleys here has been interrupted, probably more than once, by earth movements which have disturbed drainage.

Some other points are well brought out by Fig. 3. It may be noted in the first place that it is an enlarged representation of the area marked *Albanian Gap* in Fig. 1, and shows a part of the coast in the vicinity of San Giovanni di Medua. The special feature of the area is the presence of three successive depressions, counting from the coast inland, separated by three water-partings. These are the basin of which a part is covered by the waters of the Scutari lake, the Metoya basin, and the Kosovo Polye. The Metoya basin, as the map shows, is drained by the White Drin, but the main Drin river passes in a deep ravine through the limestone country which separates it from the coast, and only a very rough track connects, *e.g.* the town of Prizren with Scutari and the Adriatic. The Kosovo depression drains, as we have seen, both north to the Western Morava by the Ibar and south to the Vardar. It is at present connected by rail with Salonika through Uskub but not directly with the north. In view of the fact that river valleys here are of so little use, would Serbia be wise to disregard them altogether and boldly construct a line of rail through the Albanian Gap, thus connecting Nish directly with Pristina, the Metoya basin and the Adriatic coast? She herself has answered this question in the affirmative, and it is not too much to say that her desire to extend to the sea here has been one of the con-

tributing causes of the present war. But this brings us to the whole difficult question of the natural direction of expansion of the independent states, and the reasons why extra-peninsular Powers have interfered so persistently in connection with these. In order to discuss these questions with profit we must first devote some space to the peoples of the peninsula and their occupations.

The Peoples of the Peninsula.

No less than six native races occur within the boundaries of the peninsula, and this apart from those like Jews and Armenians, who though not native are numerously represented there. Of these six three are, or are believed to be, the descendants of very early inhabitants of the area, while the remaining three are derived from immigrants which have entered it at different times owing to that ease of access of which we have spoken.

The three who are claimed by many geographers to be directly connected with pre-Christian inhabitants, are (1) the Greeks, often regarded as the modified descendants of the ancient Greeks, though there is probably a considerable mingling of blood; (2) the Albanians, often stated to be nearly related to the Illyrians, though again there is clearly a considerable mixture of blood; and (3) the Vlachs, Roumanians, or gypsies, a comparatively small number of whom exist, often living a nomadic life, and typically shepherds or carriers. The three immigrant races are (4) the Serbs, true Slavs who entered the peninsula in the sixth and seventh centuries of our era, (5) the Bulgars, supposed to be of Finnish origin, but strongly Slavicised, who arrived in the seventh century, and (6) the Osmanli Turks, who did not arrive from Asia till the middle of the fourteenth century.

We need not stop to discuss the physical characteristics of the different races, for, from the geographical point of view, the differences in their occupations and social polity are much more important.

The Greeks typically inhabit regions of Mediterranean climate, where the olive, the vine (often grown for currants, in other cases for wine), southern fruits, especially the citrus fruits and the mulberry, are the characteristic cultivated plants. The mode of land cultivation thus partakes more of the nature of gardening than of agriculture in the ordinary sense. Since, even in the latitude of north Greece, the Mediterranean climate does not extend far inland—for example the inner plains of Thessaly have a somewhat extreme climate, and produce grain rather than fruits—the Greek is typically a coast dweller. Where he leaves his own climatic zone it is generally to become an inhabitant of coastal towns, which explains his appearance in Constantinople and the towns of the north Aegean coast. More than this, though a keen trader he is largely engaged in maritime rather than inland trade. The explanation is to be sought in the conditions of life in his own mountainous, sea-fretted land. The cultivation of southern fruit-trees, including in this general term the production of olive oil, the drying of currants, the making of wine, the operations connected with silk production and

so forth, demands continuous labour, but it is not arduous in the sense that ploughing is arduous. Thus while ploughed land can rarely be worked except by men in their prime, the work of the Mediterranean peasant's plot can be done, to a large extent, by the weaker members of the household, the old men, the women, the children. Further, as the land produces chiefly luxuries, exchange is almost a necessity of existence, and the proximity of the sea facilitates trade. Thus there is a natural tendency for the young men to seek their fortune across the adjacent seas; their trading instincts are the obvious outcome of these conditions.

Except in grain-producing Thessaly, which still suffers from a system of land tenure which is an inheritance from Turkish times, the hold of the Turk on Greece was always relatively weak. Dr. Chalikiopoulos, a Greek geographer, explains this by pointing out that the gardener peasant is scarcely worth robbing. His painfully terraced strip of sloping ground, with all the labour of his household, produces but little more than will supply their needs, and if conditions become too bad the sea affords a possible mode of escape. Now the Turk, who is neither agriculturist nor trader, can only live in the general case on the labour of others, and can thus only establish himself securely in a land of ploughing peasants. In other words, since he is by nature a parasite, it is only the hive bee which is of any use to him.

Speaking generally, until 1913 Greeks only occurred in numbers within the reach of the typical Mediterranean climate, or as traders in towns, chiefly coastal towns. At the 1913 settlement the political boundaries of their country were enlarged to include, in southern Macedonia, lands where the characteristically Greek mode of life was scarcely possible, lands moreover not predominantly inhabited by Greeks by race. Whether or not this inclusion was the fruit of a wise and statesmanlike policy, it is perhaps too soon to say. At the same time it is necessary to point out that because of it Greece drew upon herself the fierce hatred of Bulgaria, and thus rendered it impossible for her to interfere on the side of the Allies at an early stage in the present war, though this might have permitted her to acquire lands in Asia Minor with a large Greek population.

Of the Vlachs, interesting though they are, we need say little, for their numbers are too small for them to have any great political significance. They are regarded by many as being closely related to the Roumanians, but this, like most statements in regard to the relations of Balkan peoples, has been denied. As already stated, they are typical pastoral nomads, tending to add to this fundamental occupation that of acting as carriers, owing to their beasts of burden and their familiarity with the rough tracks over the hills. Out of these two occupations, again, grow naturally a number of arts and crafts, depending upon raw material obtained from their flocks, or found in the forests during their wanderings. The products of these handicrafts are naturally sold to the inhabitants of the villages through which they pass, and social development subsequently takes various directions, so that we have prosperous Vlach merchants on the one hand, and, on the other, sedentary colonies of Vlach artisans in towns and villages. Since, however, they have

practically no written literature, and no national church, they tend to become merged into the surrounding populations, losing their language and special characteristics in the process. A large number have become "Hellenised." The possibility of continuing their nomadic life of course diminishes with the closer settlement of the peninsula.

It is interesting to note that their nomadism may be regarded as a mode of evading the Turk, as the Albanians have evaded him in another way owing to their mountainous land. The shepherd, whether wandering from hill to plain with the seasons, or all but shut off from the rest of the peninsula in the mountains of Albania, makes a poor host for even a military parasite. The soldier may kill the shepherd and eat his sheep, but the operation cannot be indefinitely repeated, while by leaving the ploughing peasant a handful of seed corn and a bare margin of food, the conqueror may depend on fresh harvests with each recurring season.

The Albanian may be dismissed almost as briefly as the Vlachs, though the Albanians are far more numerous, and at the 1913 settlement were so far honoured by the Powers as to be provided with a German ruler and a state of their own. The ruler ran away after a brief reign, and the state has fallen into a state of suspended animation from which it seems unlikely to rally.

The Albanians inhabit the mountainous and hilly regions inland of the north-to-south stretch of the western coast of which we have already spoken. Their extension into the small basins which lie still further inland varies with the political conditions, and it is remarkable that while in Albania, as an exceptional condition on the west coast of the peninsula, there is a coastal plain, this is scarcely inhabited by the Albanians, save as a grazing ground in winter when the snow drives them off the heights. Typically the people are shepherds, but where possible a small amount of cultivation is carried on, and around Scutari this amount becomes considerable. Under Turkish rule, before 1908, the Albanians enjoyed a very considerable amount of freedom, partly because control was difficult to exercise so far from the capital, and partly, there is no doubt, because they formed an efficient "plug" in the Albanian Gap. That Gap was watched jealously, from within by Serbia and Montenegro, from without by Italy and by Austria, and the wily Turk was too prudent to give any of the adjacent states a reason for interfering. Independent Albania was, politically speaking, a plug re-constructed by Austria and Italy to block Serbia and Montenegro, pending some settlement of the mutual difficulties of the first two Powers in the Adriatic.

Among the great difficulties in the way of a stable state of Albania are the facts that the different tribes speak dialects not fully intelligible to each other; that there is very little written literature; that in religion the people are Moslem, or Roman Catholic or Orthodox, so that there is no unifying church; that communications have hitherto been so bad that free intercourse has been impossible, and that in consequence certain primitive features, notably the prevalence of blood feuds, persist to this day. Perhaps the greatest difficulty of all, however, is that there is little evidence that the Albanians ever wanted to form an independent state; they were used as pawns in a not very noble game of *Weltpolitik*.

The Serbs occupy, almost unmixed with other peoples, the Serbia of the period immediately prior to the last Balkan wars. They form a large majority in Bosnia-Herzegovina, they are numerous in Dalmatia, they occur almost without intermixture in Montenegro, and mixed with other races, especially Albanians, in Old Serbia and North Macedonia, and they form the majority of the population in Slavonia and Croatia. Though the typical Serb is commonly said to differ notably from the typical Bulgar, the contrasts usually drawn being more or less those which are often held to separate the Lowland Scot from the south country Englishman, yet there is much reason to believe that in the areas where the two populations meet there is considerable resemblance between them. Both where they are free from outside interference, as in Serbia and Bulgaria, are essentially peoples of small holders, cultivating the land which they own, showing a passionate attachment to it, and producing cereals, especially wheat and maize, in large amounts. Further, since in both cases, but especially in Serbia, there is much pasturage, livestock rearing is important. For the most part this is for meat production, for dairy farming is little practised, especially in Serbia, in part because the setting aside of fertile land to grow fodder crops for animals is out of harmony with the peasant's notions, and feeding stuffs are not easily imported. In Serbia fruit is also important, the plum (prune) being grown on the large scale and exported in various forms. Among both peoples traces of Slav communism remain, in a more or less developed condition, and both show many features common among populations of small farmers. Thus both sexes marry early; the birth rate is high and illegitimacy is rare; the theoretical inferiority of the women is not in practice incompatible with the fact that a considerable amount of power rests in their hands, and each homestead tends to be self-sufficing, producing primarily for its own needs, and secondarily to pay taxes and to purchase articles which cannot be home-produced. Such peoples are necessarily highly democratic, and when all the conditions of their life are borne in mind it is not unnatural that they should possess great powers of resistance to outside interference, but no marked capacity for taking large political views.

We have spoken of the distribution of the Serbs outside the country of Serbia. In regard to the Bulgars it should be noted that there are many in Thrace, especially descendants of Moslem converts (Pomaks), and there are many also in Macedonia; but the whole question of the population of Macedonia is extraordinarily complex, more especially because a religious problem intervenes. As is well known, the Turkish Empire is a perfect example of the theocratic state: in her population she recognises only Moslems and non-Moslems, and the latter belong not to races but to churches. Thus till the Bulgars seceded from the Greek Church, Christian Bulgars were "Greeks" to the Turkish power. It is a necessary result of this that in Turkish land the Church is a great political force, almost the only one with any power. In a region like Macedonia, where the social and economic conditions have been about as bad as they could possibly be, the temptation has been great for individuals and groups of individuals to attach themselves to the church in their own

FIG. 4.—Sketch-map to show suggested partition of Macedonia, according to the secret treaty of 1912. The part of Macedonia north of the shaded area was recognised as belonging to Serbia's sphere of interest, that south and east to Bulgaria, and the shaded area was left for future arrangement.

locality which seemed to have most power. The result is that they change their "race" with the fortunes of the competing religious communities.

With all reserves made, however, it seems certain that, at least in the country districts, there is a very strong Bulgarian element in south Macedonia, in lands which are now Greek, and also further north, in lands which are now Serbian. Prior to the Balkan wars of 1912-13 this fact was recognised by Serbia, for in her secret treaty with Bulgaria, which preceded the first war, she recognised as Bulgarian in character all the area south and east of the shaded part on Fig. 4. Bulgaria similarly recognised Serbian interests in the part lying north of this area, while this tract itself was to be the object of negotiation after the war. Only when Serbia was excluded by the Powers from the Adriatic coast did she refuse to be bound by the secret treaty, on the ground that, being excluded from the one sea by the Powers, it was impossible for her to permit two states and two customs barriers to intervene between her and Salonika. Since Greece had already obtained that valuable port, Serbia refused to permit Bulgaria also to cross her path. Thus the shaded area, together with, as the map shows, a considerable tract further south and east, became Serbian in 1913.

Leaving these difficult and disputed questions for the present, we may pass on to say a word or two about the last race of the peninsula, that of the Osmanli Turks. These are relatively few in number, and apart from a poor lower class, found especially in the towns, consist of landowners, administrators and military officials. The first do not themselves cultivate the land and they do not engage in trade. As feudal proprietors they merely extort from the cultivator a share which varies from one-half to one-third according to the arrangement made, while themselves taking little or no interest in agriculture. The peasant has also to pay state taxes, which under Turkish rule are farmed out, and when illegal extortions are added, as they usually are, to the recognised ones, the condition of the cultivator in Macedonia is readily understood. In other words, as we have already stated, the Turk in those parts of the peninsula which are cereal-producing is a parasite upon the cultivator, and no list of his estimable qualities, his courage, courtesy to his equals, and so forth, can weigh down the balance in his favour while this statement remains true. He does not engage in trade, which is left to Greeks, Jews and Armenians. The result is that wherever the Turk occurs as feudal landowner we find, as in Macedonia, a crushed and desperate peasantry, a slovenly system of agriculture—for why toil when only the lord and the tax-gatherer gain from a higher yield?—and seething unrest. Again, wherever the ploughing peasant achieves liberty and political power, as he has done in Serbia and Bulgaria, he endeavours to become owner of the ground he cultivates, agricultural methods improve, the population increases, and the farmers display, if their sacred land is menaced, that tenacity of resistance which has astonished the world in the case of Serbia. It is because Austria-Hungary has not sought to satisfy the peasants of Bosnia, still largely under the control of feudal lords, that the people there look longingly across the border to Serbia,

as to a promised land, and despite all the apparent benefits of Austrian rule remain discontented and dissatisfied.

External and Internal Politics: Serbia's Access to the Sea.

This general account of Balkan geography enables us to turn next to some consideration of political problems, in so far as these are affected by geographical conditions.

Serbs and Bulgars, whether within or without the lands which before 1913 were theirs, are, as we have seen, fundamentally associated with a continental climate, and a mode of land utilisation which yields in favourable circumstances a surplus of cereals and of livestock, as well as of temperate fruit. The fact that their lands lie relatively close to regions of Mediterranean climate, where cereals and livestock can rarely be produced on a scale sufficient to meet the local demand, suggests that a flourishing export trade could easily be established. In Serbia and Bulgaria such trade indeed exists, but it has been hitherto greatly hampered by the fact that Serbia has still no direct access to the Mediterranean Sea, and Bulgaria, even since the 1913 war, has only an imperfect one in the shape of the port of Dedeagatch, with which she has no direct railway connection except through Turkish lands. Further, Bulgaria's Black Sea ports are menaced by Roumania, who in 1913 insisted upon a "rectification" of the frontier which brought her perilously near Bulgaria's most valuable port of Varna. Serbia is even in a worse case, for no natural boundary, save the Save-Danube valley, separates her from the agricultural plains of Hungary, which produce precisely the commodities of which she herself has a surplus. Thus with no direct outlet to the sea, her export trade to the north is hampered in every possible way by the jealousy of a neighbouring agricultural power. The conditions are further complicated by the fact that the dominant race in Hungary is that of the Magyars, who oppress the Slav population within their own territories, and are therefore very indisposed to permit a free Slav state outside their borders to prosper.

Austria, as distinct from Hungary, has other motives in addition for preventing the natural development of Serbia. As a manufacturing nation, she wants outlets to the east, and those tectonic valleys in Macedonia, of which we spoke on p. 290 (see Figs. 2 and 3), suggest themselves as possible routes for her to Salonika and the Aegean. A prosperous Serbia will certainly expand, as indeed she did expand in 1913, in this direction, whence Austria's desire to find a reason for depriving that state of her recent gains.

Once again, the now abandoned alliance between Austria and Italy was the merest cloak to cover a very real jealousy between the two Powers, a jealousy which centred especially round the Adriatic. That sea narrows greatly in the region of the Straits of Otranto, and Austria-Hungary's only commercial ports, as well as her only naval bases, lie at the head of the Adriatic. (See the Coloured Map.) Were Serbia allowed to extend through the Albanian Gap to the Adriatic, some sort of an understanding between her and Italy would be a foregone conclusion.

FIG. 5.—The existing and the projected railways of the peninsula. Note especially the absence of any line leading from the shore of the Adriatic inland save that running from Metkovitch to Sarajevo, which is a narrow-gauge line, and the general paucity of railways in the western part of the peninsula.

Were Italy established on the other side of the Adriatic, *e.g.* at Valona, which she occupies at present, then her control of the Adriatic becomes inevitable, and Austria's trade and Austria's fleet are menaced in time of war. In consequence in 1913, it seemed better to the Powers that Serbia should be shut from the sea than that the problems which confront Italy and Austria should be squarely faced, and thus the catastrophe of 1914 was prepared for.

There is, however, more in the matter than this. The map at the end of this article shows the head of the Adriatic Sea, with the position of Austria-Hungary's two great ports, Trieste and Fiume. To safeguard these, the Dual Monarchy holds Dalmatia; to safeguard Dalmatia she holds Bosnia-Herzegovina. But the inhabitants of Bosnia-Herzegovina are, so far as the majority is concerned, Serb of race, and it has seemed to the Austrian administration, with that curiously short-sighted policy which has been so often its undoing, that by keeping the Slav peasants here in poverty and subjection, she can suppress in them their natural desire to share in the prosperity of free Serbia. As a policy this is extraordinarily short-sighted, for if Serbs and Bulgars have wrenched themselves free from the hold of the Turk—a past master in the art of oppression—it seems unlikely that their blood brothers in Bosnia-Herzegovina can be permanently cowed by the milder measures available to a European power, even an unscrupulous one. Having been unsuccessful in subduing her own subjects in Bosnia-Herzegovina, it has seemed to the Austrian authority that if free Serbia were completely crushed, those subjects might be reconciled to bearing their present ills lest a worse thing befall them. This has been one of the motives bringing about the present war; but so far Austria, as we know, has been singularly unsuccessful in her attempts to crush Serbia.

Before the outbreak of the present war, it seems fairly clear, efforts were made to foment trouble among the independent Balkan States in the hope that the crushing of Serbia might be brought about in that way. By preventing Serbia from reaching the Adriatic all three states, Greece, Bulgaria, and Serbia, were forced towards the Aegean as an outlet. The Greeks desired the northern coast of this sea, in part because of the number of their compatriots in the coastal towns; Serbia wanted, what she has failed to get, an outlet here in default of the Adriatic one; Bulgaria wanted such an outlet not only because of the Roumanian menace, but because, as we have seen, the Struma valley leads almost directly from her capital to the sea, and Kavala would be for her a most valuable port.

Bulgaria, with a real grievance, was induced by interested foreign advice to stake all in 1913 upon a combat with her former allies: she began with treachery, and in the moment of disappointment committed acts of ruthless savagery which have recoiled upon her own head. As a result of this second Balkan war she lost to Roumania a part of her territory to the north-east, with the town of Silistria; she lost Adrianople and thus part of the Maritza valley to the Turks; and she lost to Greece and Serbia nearly the whole of the lands she had hoped to gain in southern Macedonia, and to Greece a part of the Struma valley and the ardently desired port of Kavala. (Cf. Fig. 2, which shows the old boundaries,

FIG. 6.—The old Roman roads of the peninsula. Many of these have fallen into disuse. Note the two important routes which crossed Albania and put the interior of the peninsula into communication with the Adriatic; there are at present neither good roads nor railways in this region.

with Fig. 5, which shows the new ones.) Thus of each of the two great river valleys which lead from her inner plains to the southern sea, those of the Maritza and the Struma, she has lost an essential segment. The Turk sits astride the Maritza and blocks her way to Dedeagatch; the Greek occupies all the lower part of the Struma, with the fertile plain of Seres, a region with many Bulgarian inhabitants. While on the one hand it may be said that these losses were the natural punishment of Bulgaria's treachery, on the other we have to realise that if Greece had been more generous in her hour of triumph, she could have flung herself against the Turk during the past winter, without fear of being struck in the back by Bulgaria, and might thus have gained lands in Asia Minor to which she has much claim.

Within the limits of space available here it is impossible to go more fully into the different political problems, but what has been said is perhaps enough to show that the fundamental difficulties in the peninsula are related to the fact that the unredeemed Slavs there want to own the land they till, and the independent states want to develop their lands further, which is only possible if they can have free exits for their surplus products. Hitherto the Turk has been the great obstacle in the way of the first desire, but the Austrian in Bosnia has been the heritor of his evil system. The second problem is complicated by the relief of the land, which makes natural and easy lines of communication few, but to this physical obstacle has been added a political one, which has hitherto shut off Serbia from the Adriatic, and forbidden her to attempt to utilise that Albanian Gap towards which she yearns. Whatever other changes this war bring, it seems clear that here at least she should have her way.

The physical difficulties which have to be overcome before the interior of the peninsula can be brought into touch with the Adriatic coast are well shown on the large orographical map, whose scope has been enlarged in order to illustrate the political problems brought about by the relation between Italian and Austrian lands to the north of that sea.

The two sketch-maps, Figs. 5 and 6, have been drawn to show that while at the present time no continuous line of rail connects the Adriatic with the interior of the peninsula, with the partial exception of the Metkovitch-Sarajevo line, yet in Roman times access by broad, well-made roads from that coast to the interior, and beyond to Constantinople and the Further East, was easy and that by several routes. Fig. 5 shows further that the various states are well aware of the necessity for—not reconstructing the Roman roads, but replacing them by railways. The line from San Giovanni di Medua on the Adriatic to Radievatz on the Danube, notably, were it ever constructed, would in all probability bring increased prosperity to Serbia, and peace to the rest of the peninsula, by causing Bulgaria's and Serbia's lines of export to diverge widely, instead of to converge as they would do if both Powers had ports on the Aegean.

Space does not permit us to discuss in detail either the roads or the railways, existing or proposed, but we may perhaps just note that the line which ascends the Narenta valley, in order to cross the watershed and descend upon Sarajevo, is a narrow gauge line, worked in part by a

rack-and-pinion arrangement. Even were it connected up with Serbia's railway system, it is not likely that it would ever form a useful commercial route. Up to the outbreak of the present war the line was absolutely closed to Serbia's livestock by a customs barrier, but in any case, whatever the fate of Bosnia-Herzegovina, it does not seem that Serbia's best outlet lies here. Her own passionate longings lead her to the Drin Gulf, and her most famous geographer, who has devoted much study to the region, holds that her best outlet is there.

REFERENCES.—A good general account of Cvijić's views on the structure of the peninsula, views which have been largely followed in the above description, will be found in Peucker, "Cvijić on the Structure of the Balkan Peninsula" (*Geographical Journal*, xix. 1902). See also Cvijić, "La Forme de la Péninsule des Balkans" (*Le Globe*, xi. 1900) and "Grundlinien d. Geographie u. Geologie v. Makedonien u. Alt-Serbien" (*Petermann's Mitteilungen, Ergänzungsheft*, 162, 1908), and a critical account by Philippson in the *Geographische Zeitschrift*, ix. 1903. "Makedonien" by Oestreich, in *Geographische Zeitschrift*, x. 1904, and Cvijić, "Das Pliozäne Flusstal im Süden des Balkans" (*Abhand. d. K.K. Geographischen Gesellschaft* in. Wien, vii. 1908), and "L'Ancien Lac Égéen" (*Annales de Géographie*, xx. 1911) should also be consulted.

The literature on the peoples of the peninsula, especially on the vexed question of the races of Macedonia, is extensive, but a series of articles by Professor Cvijić in *Petermann's Mitteilungen* for 1913, with a good map, may be specially mentioned. An interesting series of articles on the Roman and mediæval roads, many of which have fallen into disuse, will be found in *Petermann's Mitteilungen* for 1914, while the railway problems, together with the general policy of the different states, are fully discussed by a number of authors in many articles which have appeared during the last few years in *Questions Diplomatiques et Coloniales*. Fuller references will be found in a forthcoming book by the author of this article.

THE KINGDOM OF SERBIA: HER PEOPLE AND HER HISTORY.[1]

By D. H. Low, formerly Lecturer in the University of Belgrade.

(*With Illustrations.*)

The Country and its Products.—The Kingdom of Serbia before the recent wars with Turkey and Bulgaria had an area of 48,300 square kilometres, and a population of some two and a half millions. By the incorporation of part of Macedonia and the sandjak[2] of Novibazar following on these two successful campaigns her territory and her population were nearly doubled.

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[1] Based upon a lecture delivered to the Royal Scottish Geographical Society in Glasgow on Nov. 18, 1914.

[2] *Turkish Territorial Divisions.*—Each *vilayet* is divided into *sandjaks*, which in turn are subdivided into *cazas*. The *vilayet* is administered by a *vali* or governor; the *sandjak* by a *mutessarif* or prefect; and the *caza* by a *kaimakam* or sub-prefect.

The rivers Drina, Save, and Danube form the political boundary between Serbia and the Austro-Hungarian Empire. The Morava is the most important internal river. It joins the Danube a short distance below Smederevo (Semendria), and its valley was chosen by the Austrians as one of their lines of advance in their converging movement on Kraguievatz, the military heart of the country.

Except in the vicinity of the Danube Serbia may be described as a land of mountain and forest, criss-crossed with innumerable fertile straths and glens. The country about Dunkeld gives a very good idea in miniature of many a Serbian landscape, but we have nothing in this country to compare with the glorious expanses of oak and beech forest which delight the eye in the Shumadia. Until quite recently methods of agriculture were simple in the extreme, and even to-day ploughing in most parts of the country consists in inflicting sundry scratches on mother earth by means of an iron-shod pole dragged slowly along by a pair of yoked oxen. Yet so rich is the soil and so favourable the climate that splendid crops of maize and other cereals are produced, and grapes, melons, pears, peaches, apples, apricots, and plums flourish mightily. Amongst fruits the plum or "shliva" has pride of place. Vast quantities in a preserved form called "pekmez" are exported to America, but, more important still, the plum is the basis of the "shlivovitsa," the national intoxicating beverage. Of Serbia's wealth in pigs and turkeys little need be said save to remark that many a rasher of "prime Irish" and many a noble Christmas bird has come to table in our happy island from a country beyond the Danube. Apart from State property, the land is almost entirely in the hands of the small holder, and consequently one sees nothing corresponding to the "stately homes of England." The villages seem to have been constructed with the object of keeping the houses as far away from each other as possible, and in the most inconvenient places. A labyrinth of confusing footpaths takes the place of a village street, and it has always been a mystery to me how letters arrive at their destination. Dogs of loud bark and terrifying aspect rush forth upon the stranger, but the native has easy mastery over them.

The People.—Two distinct peasant types are noticeable, one fair-haired and blue-eyed, the other dark-haired, dark-eyed, and swarthy. They are, for the most part, splendid specimens of humanity. Brave, generous, and hospitable to a fault, they compel affection. Easily they swing along in their primitive "opantse," and when evening falls on the interminable labour of the fields their mournful songs, with their unfamiliar intervals, rise from the ground like an exhalation the strange savour of which haunts the memory for ever.

Belgrade.—Belgrade, the capital, has a population of some 80,000, and is called by the Serbs, Beograd, or the White City. It lies on a kind of whale-back promontory, along one flank of which goes the wide yellow swirl of the Save. At the extreme point, under the shadow of the vast crumbling fortress, the Save joins forces with the Danube emerging from the plains of Hungary, and in one mighty flood the united waters sweep down the other side. In 1862

the so-called bombardment of Belgrade took place, and I once heard an old lady give a most vivid account of the origin of the affair. She was looking down one day from her window, which overlooked a public fountain, when she saw a sudden violent scuffle between a couple of Turks from the garrison and some Serbians who had come to draw water. The Turks made use of their weapons, and two Serbians fell mortally wounded. A furious crowd pursued the Turks to the gates of the citadel, and the Turkish governor characteristically strove to allay the popular excitement by turning his guns on the streets of the town.

Five years later the crescent was hauled down from the flag-staff, and the Sultan's garrison marched out never to return. It is hard to

FIG. 1.—The last mosque in Belgrade; the hodja or priest is seen on the extreme left.

realise that only forty-seven years have elapsed since the Turk withdrew from the capital, but the fact is brought home to one when this old lady tells of the fight at the fountain, and that cheery old greybeard relates how he was pursued through the streets and fired on because he was taking an evening stroll without military sanction. Every one of middle age and over is a mine of interesting reminiscence; many such have played a part in their country's history, and all have witnessed marvellous changes.

In little more than a generation a dirty, straggling, picturesque, and odoriferous Turkish village has given place to modern Belgrade. The trace of the Turk has, of course, not disappeared entirely. A number of his old broad-eaved houses still huddle together, he has bequeathed to Serbians the secret of coffee-making, and one solitary little djalmia (mosque)

still thrusts upward the white needle of its minaret. An aged Bosnian "hodja" is in charge. He is supposed to climb the corkscrew stairs every day to proclaim from his lofty pinnacle the glory of Allah and the greatness of his prophet. I fear, however, that he may be what corresponds to a lapsed mass, for I had to lie in wait for a whole week before I had the satisfaction of seeing him in his eyrie, and of hearing the call to prayer.

The Faithful are now a diminished band, and are represented only by the members of the Turkish legation and by wandering Bosnian woodcutters. The latter picturesque individuals are specialists in the cutting up of tree-trunks into lengths suitable for burning in the stoves which form an integral part of every Serbian household. The native coal is of poor quality, and is but little used. The writer attempted to burn coal in his own stove, but had to give it up owing to the evil-smelling fumes which rendered his abode uninhabitable. The Austrian exploiters of Bosnia-Herzegovina have naturally taken advantage of this state of affairs, and great tracts of beautiful forest-land have been ruthlessly sacrificed and converted into barren deserts of bleaching tree-stumps. Huge rafts of lumber are floated down the Drina and Save and disposed of at various points. Doubtless the immediate profits are great, but the sight of the desolate wastes left behind is convincing evidence that the policy is a cruel and wasteful one.

Whilst the Turkish mosque, Turkish houses, and the delicious Turkish coffee give tangible proof of the former sway of the Sultan, the Turk has left a more lasting monument in the mark he has made on the mentality of the people. It appears in such things as temperance, disregard of the value of time, and in a certain well-marked fatalism.

Some thirty years ago an Englishman ventured to walk down the principal street wearing a silk hat. He was followed, so he tells me, by a hilarious throng. All that is changed now. Top-hats have multiplied exceedingly, bringing in their train a plentiful following of bowlers and soft German felts. This quick change has given Belgrade a characteristic note of contrast. There are no delicate shadings off between the old and the new. Many intermediate steps have been omitted—for example, gas as an illuminant is unknown—and the primitive is opposed to the up-to-date. Thus we see the springless ox-cart side by side with the overhead trolley and the motor car, the twopenny dip and electric light, the grand hotel with its winter-garden and its string band, and the Kineski Tsar (Chinese Emperor) with Turkish music and the "danse du ventre."

The monotonous clothing of the West and the brighter colours of the East serve as a mutual foil. The American boot beats time on the pavement with the native "opanka," the frock-coat rubs shoulders with the sheepskin, the top-hat cleaves the upper air with tarboosh and shubara, whilst correctly creased trousers share the lower levels with the white kilt-like shirts of the peasantry.

Take your stand on the fortress battlements and throw your eyes up the river Save, and there glittering in the sun you will see something that looks like a thread of gossamer. It is the railway bridge, and the

slenderness of it symbolises in some sort the nature of Serbia's community with the great Western world. So keenly do Serbians feel their isolation that they talk of going to Europe as if they themselves were dwellers in another land. At the base of the fortress the muddy Save joins the muddy Danube, and straight over the meeting of the waters a mile and a half away lies the town of three names—German Semlin, Hungarian Zimony, and Serbian Zemun.

The population of the town itself, as of Slavonia, the province in which it lies, is Serbian with a liberal top-dressing of over-bearing Hungarian officials. It is the last stop before Belgrade, and even in times of peace there was a rigorous examination of passports and some-

FIG. 2.—Market scene. The figure in the foreground is a peasant from Old Serbia in the characteristic costume.

times even of personal effects. On occasion this was pushed to vexatious lengths, as I know to my cost.

The social life of Belgrade is largely political and centres round the legations. Austria and Russia naturally had pride of place, and the latter must often have been hard put to it to meet the machinations of Austro-Hungarian policy, whose aggressiveness made itself felt at every turn. Austrian spies and agents-provocateurs swarmed everywhere, and Serbians had that demoralising consciousness—since felt by Belgians and Frenchmen—that they could scarcely call their souls their own.

The Church in Serbia is an independent branch of the Greek Orthodox Church, the calendar is old style as in Russia, and is plentifully strewn with red letter days on which it is praiseworthy to do no work. A number of old ecclesiastical buildings are still standing. The finest of

these is the monastery church of Studenitza, in the valley of the Ibar. It is built of white marble and is still beautiful, although many of the carvings were defaced by the Turks. The miracle-working remains of King Stefan Nemanja (+1199) are preserved here in a silver sarcophagus, and there is also a splendid collection of votive offerings consisting of native gold and silver work—buckles, brooches and the like.

Travel in Serbia.—Travel in Serbia is easy enough if one is not pressed for time. The main railway line runs from Belgrade to Nish, where it divides into two, one line running *via* the Dragoman Pass to Sofia and Constantinople, the other to Salonika *via* Vranya and Skoplie (Uskub).

There are several small branch lines, namely, from Belgrade to Valievo, from Velika Plana to Kraguievatz, from Stalatz through Krushevatz to Kralievo, and from Skoplie to Mitrovitza.

Most of one's travelling, however, must be done on foot, on horseback, or in vehicles resembling ancient Parisian fiacres. Outside of Belgrade, Nish, Kraguievatz, Shabatz, and a few other places, towns can scarcely be said to exist, and even Nish, the second city, resembles a huge village rather than a town.

Nish has still a very oriental look about it, women in baggy trousers roll about the streets, and its chief sight is the "Chela Kula" or "Tower of Skulls."

This remarkable building was erected by the Turks in commemoration of a victory over the patriot Sindjelitch and his men. The walls were plastered over with a thick layer of mortar and the skulls of the slaughtered Serbs were embedded all round in neat rows. Only two or three skulls now remain in position, but the gruesome pile still stands, the skull-shaped indentations showing clearly how large was the number of victims. Another relic of the past is an inscription set up by an Ottoman grandee enjoying the proud title of "Governor of Nish and Budapest."

Once away from the railway you go back a century or two. Travelling for pleasure is unknown to the native, and he does not understand it in others. The old questions, "Whence comest thou?" "Whither goest thou?" and "Wherefore art thou come?" have to be answered twenty times a day. The wayside "hans" are not ideal places in which to spend the night, as insect life is abundant and voracious, but much can be done by putting up at monasteries or by applying to the kmet or headman of any village where you decide to stop. The hospitality of the Serb is unbounded, and he will put himself to no end of trouble and inconvenience in order that his self-appointed guest may be comfortable.

The History of Serbia.

The inhabitants of Croatia and Slavonia, of Bosnia and Herzegovina, of Dalmatia, Montenegro and Novibazar sandjak are Serbs, and the same tongue is spoken by ten millions of people from Neusatz to Uskub, from the Danube to the Adriatic. There is no excuse nowadays for ignorance of this fundamental truth. It is the key to much of the seeming chaos

of Serbian politics. In the early part of the nineteenth century, under Kara George and Milosh Obrenovitch, a section of the Serbian race wrested their independence from the hideous tyranny of the Turks, the nature of whose dominion is typified by the old place of impalement at Belgrade and by the grim Chela Kula, the Tower of Skulls, at Nish.

The territory thus set free became known as the Principality, and later as the Kingdom of Serbia, and its effect upon neighbouring Serbs still subject to alien rule may be compared to the action of a globe of quicksilver upon surrounding particles. But its influence did not end there, for the success of Kara George and Milosh caused a stir through-

FIG. 3.—A street scene in Belgrade: "Boza" seller, woodcutter and peasants. Boza is a popular cooling drink.

out the Balkans which led directly to the liberation of Roumania, Bulgaria and Greece.

In 1875 Bosnia-Herzegovina revolted against the Sultan, and in the following year Serbia and Montenegro declared war in support of their kinsmen. Public opinion in Russia was profoundly moved, for the Russians, closely related as they are to the southern Slavs, looked upon them now as upon brothers in adversity.

"La Serbie," wrote Marie Bashkirtseff in 1876, "cause une vraie désertion; puisque l'Empereur ne veut pas déclarer la guerre, toute la Russie souscrit et se soulève de cœur pour les Serbes. On ne fait qu'en parler, on exalte les morts vraiment héroïques d'un colonel et de plusieurs officiers russes. On ne peut que se sentir ému de pitié pour nos frères qu'on laisse tranquillement égorger et couper par morceaux

par ces affreux sauvages de Turquie, par cette nation sans génie, sans civilisation, sans morale, sans gloire."

In spite of the impatience of his people the Tsar held his hand until the spring of 1877, when at last he declared war on Turkey. Osman Pasha's brilliant defence of the Bulgarian village of Plevna came within measurable distance of wrecking the campaign, but with the fall of that place Turkish resistance collapsed and the victorious Russians marched to the gates of Stamboul.

The war ended with the treaty of San Stefano, drawn up by Russia on what were in the main sound and statesmanlike lines. Speaking broadly, its terms were based on the principle that racial and political boundaries should be made, as far as possible, to coincide. Unhappily such enlightened action was utterly beyond the comprehension of the rest of Europe, and at the notorious Congress of Berlin in 1878 this country took the lead in defending Turkey and browbeating the Tsar.

The Turcophil obsession was the one conspicuously baneful reaction of the Indian Empire upon our European policy. In a letter written immediately after the Bulgarian atrocities, Sir Henry Elliot, our ambassador at Constantinople, says: "We have been upholding what we know to be a semi-civilised nation, liable under certain circumstances to be carried into fearful excesses; but the fact of this having just now been strikingly brought home to all of us cannot be a sufficient reason for abandoning a policy which is the only one that can be followed with a due regard for our own interests." Imbued with this spirit, Disraeli scanned the terms of the treaty of San Stefano and worked his hardest to have them revised in a sense unfavourable to Russia. Macedonia was removed wholesale from the proposed new state of Bulgaria and handed back to the Turks, whilst the remaining Bulgars were further arbitrarily split up into the vassal province of Eastern Roumelia and the tributary principality of Bulgaria.

The proposal to grant autonomy to Bosnia-Herzegovina as a step towards ultimate union with Serbia was sternly vetoed by the Congress. The pleadings of the Serbian delegates fell upon deaf ears, and Austria-Hungary obtained a mandate to occupy the provinces provisionally and without prejudice to the sovereign rights of the Sultan. The Bosnians, finding that their struggle for freedom had only resulted in exchanging one taskmaster for another, rose in furious revolt, and the Austrian army of occupation had to fight its way to Sarajevo. In addition, the Austrians seized part of the sandjak of Novibazar, and by thus driving a wedge of territory between Serbia and Montenegro, effectually checkmated any attempt at union on the part of these countries. The great Teutonic "Drang nach Osten" had begun, and the Serbs saw themselves rent apart and held asunder by an irresistible force. It was an easy task now to persuade King Milan that Russia was a broken reed, and that Serbia would consult her own interest by transferring her allegiance to Austria. Entirely on his own responsibility, and without the knowledge of the Skupshtina, Milan signed the extraordinary secret treaty, the story of which was handed to the writer by the late Mr. Stoyan

Protitch, and published for the first time in the *Fortnightly Review* of May 1909.

Briefly, he undertook to renounce all claim to Bosnia-Herzegovina. In return the family of Obrenovitch was to bask in Austrian smiles, and a continuance of the smiles was guaranteed if ever it should enter King Milan's head to extend his boundaries at the expense of the Bulgars.

In 1885 came the revolution of Philippopolis, when "Eastern Roumelia," that precious bantling of the Berlin Congress, very properly declared herself one and indivisible with Bulgaria. While diplomatists argued and wagged their heads over the *fait accompli*, Milan, egged on by Vienna, took the ridiculous step of posing as the champion of the Congress, and boldly forbade the banns when the wedding was safely over. With an ill-prepared army he marched through the Dragoman Pass and encamped at Slivnitza within sight of Sofia. The remarks of the Swiss mercenary Bluntschli in *Arms and the Man* give a true hint of what followed. The Serbian columns failed to co-operate, their supplies were inadequate, and, after a confused and stubborn conflict, they fell back across their own frontier hotly pursued by the triumphant Bulgarians.

At this point Austria came to the rescue of her discomfited protégé, and stopped the war. When it became known that if Serbia had been victorious at Slivnitza, Russia would have intervened on behalf of Bulgaria, the whole affair was seen to have been a war of puppets. Slivnitza was regarded as a successful stroke of Austrian diplomacy, for Serbia was weakened, her attention was diverted from Bosnia, her relations with Bulgaria were hopelessly embittered, and King Milan became more than ever a tool in the hands of the enemy. The country was now a valuable piece in the grandiose Austrian game of expansion in the direction of the Aegean, and Belgrade, through no fault of her own, became a veritable nest of intrigue. A Cromwell would have been hard put to it to guide Serbia aright in these difficult times, and the ill-fated Alexander, King Milan's son and successor, was no Cromwell. From the sensational ministerial banquet in the palace, when he placed all his guests under arrest, to his marriage with Madame Draga Mashin, his career was a succession of blunders. He united against himself the supporters of the Kara-George family and certain of Draga's own private enemies, notably Colonel Mashin, her brother-in-law, who had, or believed he had, very excellent grounds for wreaking vengeance on her. Russia and Austria were well aware of the conspiracy, but the time has not yet come to apportion their respective shares in the tragedy that followed. On the night of the 11th of June 1903 the hapless Alexander and his Queen were ruthlessly done to death. The truth of the whole matter is perhaps best summed up in lines originally applied to an event in Scottish history:—

> "Tho' the chiel was weel awa,
> The deed was foully done."

When the news flashed round the town in the early morning Belgrade was at first dazed and stupefied, and then the great question

presented itself—"What would Austria do?" What Austria did was to prepare for immediate invasion. She confidently looked for the outbreak of riot and insurrection, and it was clear that, as in the case of Bosnia, Europe would readily grant her a mandate to "restore order."

There was no riot and no insurrection, and Peter Karageorgevitch came quietly to Belgrade and was quietly crowned king. Since that time Austria has sought by every means in her power to render impossible the continued existence of Serbia as an independent state.

She sedulously fomented the old enmity with Bulgaria and, by reason of her geographical position, was able to apply a suffocating economic pressure. In these circumstances Serbia strove with some success to develop her export trade through the Turkish seaport of Salonika, while, at the same time, she tried to obtain the Sultan's permission to build a railway which should link up the important junction at Nish with San Giovanni di Medua on the Adriatic. But Austria offered the strongest opposition to the construction of any such railway, and the whole scheme consequently came to nothing. The Slavs, however, are a people of extraordinary pertinacity, as even the Prussians have found to their cost. The national Serb movement, far from being crushed by oppressive measures, seemed rather to derive strength from them. The story of the liberation of Italy was a lamp to the feet of Serbian patriots, and lit up the difficult path that they were fain to tread. Every year marked a steady growth in that consciousness of solidarity which, it was hoped, would ultimately lead to the union of the various members of the Serbian race. The project was far from being a mere idle dream. Austria-Hungary became seriously alarmed, and in 1908 she played her master-stroke by formally annexing the provinces of Bosnia-Herzegovina. The fact that the German Prince Ferdinand of Bulgaria almost simultaneously proclaimed himself Tsar was a sinister sign of close co-operation between Vienna and Sofia. Amongst the Serbs the intensest indignation and excitement prevailed. Russia, France, and Great Britain protested against the annexation as a gross violation of the Berlin Congress. This was the moment chosen by the Kaiser to step forward and place himself by the side of his Austrian ally. When Count Pourtalès presented the German ultimatum at Petersburg, Europe seemed to tremble on the brink of war, but Russia was unable to face the prospect, and the protest of the Triple Entente was contemptuously swept aside. It was a notable triumph for Teutonic truculence, and, particularly in Bulgaria and Turkey, German prestige was enormously enhanced. This success was tempered by events which quickly followed. First came the war in Tripoli which set Italy and Turkey by the ears, and embarrassment reigned in Berlin at the spectacle of an ally in grips with a protégé. Then the Balkan League came into being, but this was by no means so alarming to the Teutonic Powers, for they confidently expected that the Turkish army, trained by the great von der Goltz, would make short work of the League, or at least so shatter it that the task of Germanic aggression in the Balkans would be materially lightened.

But the unexpected happened, the Turks were crushed, and the

Serbians in one of the most daring and arduous marches in military history made their way through the snowy wilds of Albania to the sea. On a sudden Austria developed an unwonted solicitude for the welfare of Albania. After sternly informing Serbia that there was no seaport for her there, she carried the farce to the point of solemnly installing Prince William of Wied as "Mpret" of the new Albania. No matter that the comic opera Mpret was destined to be driven forth in ignominious flight by his unwilling subjects. The serious object of the move was to bring discord into the councils of the League, and in this it was only too successful, for Serbia, baffled once more in her efforts to obtain a free outlet, pressed for compensation in the Vardar valley, a

FIG. 4.—Water melons in the market at Belgrade.

district claimed by Bulgaria, but at the moment actually occupied by Serbian troops. Bulgaria, however, was in angry mood, for Greece had beaten her in the race for Salonika, the prize of the war, and now the Serbs were trying to deprive her of her rightful share of Macedonia. The Serbian argument was, that owing to Austrian intervention, Serbia would be worse off than she was before the war unless the League would consent to modify the terms of the *ante bellum* agreement. With the permission of Greece she offered to refer the dispute to the arbitration of Russia, but unfortunately Teutonic influence at Sofia was too strong to admit of any such peaceful solution. Ferdinand of Bulgaria, himself a German, confirmed in his uncompromising attitude by a declaration of Austrian sympathy, made a sudden treacherous attack on his former allies. He did this in the full assurance of complete success, and his misguided action affords a remarkable analogy to that of King Milan

in the Slivnitza campaign of 1885. So unexpected was the first onslaught that for a time the issue hung in the balance. The bloody battle of the Bregalnitza raged for days before victory declared itself in favour of the Serbs. The Greeks also beat back the Bulgar assault, and when the Roumanians marched on Sofia from behind, the game was up, and the astute Ferdinand had perforce to agree to the terms of the treaty of Bukarest, August 1913.

Yet again had Austria-Hungary suffered deception. If she had expected the Turks to make a much better showing in the first war, she had made sure that Serbia would be annihilated in the second, and neither of these things had happened. Still much had been achieved. The dangerous *rapprochement* between Serb and Bulgar had been utterly destroyed, and as Serbia had lost 5000 killed and 18,000 wounded in the Turkish, and 7000 killed and 30,000 wounded in the Bulgarian campaign, she might now be regarded as clay in the potter's hands.

True, the Austro-Hungarian newspapers at this time begged the world to take note of the noble generosity and restraint of their government. How easy it would have been, they said, to have attacked Serbia in her weakness, and so to have put an end to the South Slav menace for all time. But Signor Giolitti's recent statement in the Italian Chamber revealed the ugly truth that it was not "generosity" that stayed an Austrian invasion in 1913, but only the hostile attitude of Italy towards an act of such wanton aggression. The final cataclysm was only delayed.

In June 1914 came the startling tragedy of Sarajevo, perpetrated, be it remarked, by Austrian subjects. This important point was obscured to the average reader by the fact that the assassins were always referred to as Serbs. The inhabitants of Bosnia were indeed Serbs, but as the Austro-Hungarian press has the verbal trick of calling them Bosnians when it wishes to commend, and Serbs when it wishes to condemn, a widespread impression was formed in the West that the assassins were alien interlopers, and not, as in fact they were, native to the soil. The assertion that the Serbian government at Belgrade was implicated in the crime is unworthy of consideration.

At the time of the Sarajevo murder Serbia was exhausted with her two campaigns. She desired peace above all things, and was prepared to go almost any length in order to obtain it. Signor Giolitti's statement already referred to dispels finally any possible doubt as to which country was looking for trouble. Thus upon an iniquitous pretext Serbia was roughly ordered to renounce her independence, and on July 28 Austrian guns began to batter the glorious target of Belgrade.

With Austrian monitors patrolling the Save and the Danube, with an unfriendly Bulgaria on one side and a hostile Albania on the other, the matter of supplies was fraught with difficulty, and yet, after seven months of war, indomitable Serbia still faces her ruthless foe, and has already rolled back from her territory the tide of three great invasions. Private enterprise, both in this country and in America, has done something to make good the desperate lack of medical necessities, but what the people have suffered and are suffering no tongue can tell.

We are ready enough perhaps to give praise to Serbia for her magnificent achievements on the field of battle, but our eyes are naturally focused on events nearer home, and it is doubtful if many of us realise how important it is that we should give her all our sympathy and support. There is still danger of another campaign against her, and Tsar Ferdinand of Bulgaria is only awaiting a favourable opportunity to throw in his lot with Turkey and the Teutonic Powers. This opportunity would occur if Austria-Hungary could succeed in crushing Serbia, for then Berlin, Vienna, Budapest, Sofia, and Constantinople would be directly linked up on the line of the Orient Express. The fact has only to be stated to bring home to every one of us how nearly Serbia's fate concerns our own.

THE SO-CALLED MYTHICAL ISLANDS OF THE ATLANTIC IN MEDIÆVAL MAPS.

(Considered as Evidence of Pre-Columbian Exploration toward America.)

By William H. Babcock.

(With Illustrations.)

(Continued from p. 269.)

On the maps before 1400—Dalorto, Dulcert, Pizigani, Soleri (1385),[1] Pinelli (1384),[2] the Atlante Mediceo, the Catalan Atlas of 1375, etc., as well as on some later ones, Brazil is brought absurdly near Ireland, most often appearing off the Blaskets, then called Braschia, but Corvo, substantially its modern name, was treated in a similar, though not quite so extreme a manner, from 1351 onward, being brought back from its real station half-way across the Atlantic to a point unreasonably near Europe, so that it is more eastward than the middle group of Azores, instead of being north-west of them. Perhaps map-makers had learned to distrust the sailors' yarns of great western distances, and tried blunderingly to allow for them. Whatever the explanation, the error is the same in kind, and as it does not weaken our faith in a far-westward Corvo, it should not be given undue weight against an even remoter Brazil.

But the latter was not always understood to be at the very doors of the searchers. The coastal peasantry and some coast-following traders might accept it there, finding confirmation in old myths and the phenomena of mirage and fog-bank; but surely this could not be true of mariners who had ranged the seas for months together diligently seeking Brazil. Thylde and Botoner,[3] during their nine months' quarter-

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[1] Nordenskjöld, *Periplus*, Plates xviii. and xix. [2] *Ibid.*, Plate xv.

[3] William of Worcester's account is copied in Nansen's *In Northern Mists*, vol. ii. p. 295, and in most works treating of Cabot's voyages.

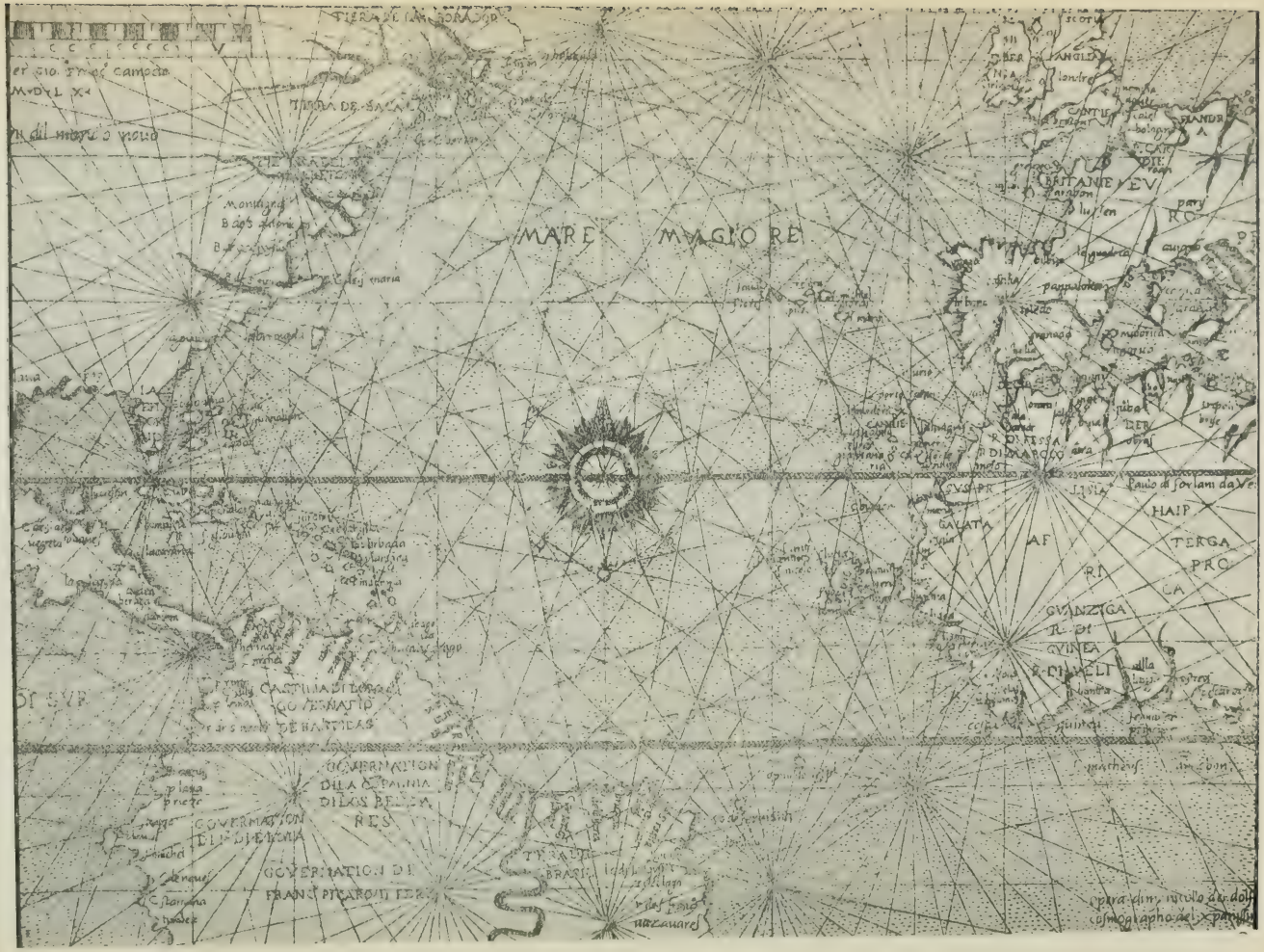

FIG. 1.—Nicolay's map, 1560. Note position of island of Brasil off the coast of Canada and forming part of an archipelago (=Newfoundland).

ing of the ocean in 1480, must have sailed over and far beyond the spot where the maps showed the object of their quest. This expedition did not stand alone; it happened to be specifically recorded only because one of the chief participants was the brother of its chronicler, William of Worcester. Others were left at most to casual entries on maps and in books, and to the general statements of contemporary correspondence. This assures us that Brazil-hunting[1] ships or flotillas put forth every year during at least a part of the period between Botoner's adventure and the successful voyage of Cabot. Now what has been said above of the former overrunning the nominal site of the island applies to all these endeavours before and afterward. Assuredly the merchants of Bristol, who financed and equipped most of them, were not so absurdly credulous as to believe, after a long series of such ocean-ransackings, that Brazil was a near neighbour of Ireland.

Even the maps were not always closely bound to this inherited convention. After the great discoveries near the end of the fifteenth century, an adequate realisation of the width of the Atlantic began to develop, and Brazil naturally went westward on some maps toward the region of new lands. Ribero[2] in 1529 located it south of Labrador, which, however, was thrust out too far eastward; Descelliers,[3] 1546, drawing for Henry II. of France, kept Brazil well away beyond mid-ocean: Nicolay (Fig. 1),[4] in 1560, planted it squarely in American waters, in the inner part of the Newfoundland banks, if not closer to that shore; and Zaltieri (Fig. 2),[5] in 1566, also placed it near that great American island. Of them all, Nicolay's union of Brazil with America is the most intimate, for he makes Isla Verde and Man (companions of Brazil) units of the archipelago into which Newfoundland was broken up, as happened often on the maps, Man being plainly on the lower side of the Straits of Belle Isle. Perhaps Brazil itself was intended in the same way, as Gastoldi[6] illustrating Ramusio (1550) gives us Baccalaos, Terra Nova, and Isla de Moni (with its pictures of little demons), all as neighbouring fragments, divided by straits, which we now recognise as merely Newfoundland inlets and bays.

Later, as the shore waters of the west Atlantic also grew more familiar to navigators and most cartographers, Brazil was again drawn back to mid-ocean, where certain ill-explored tracts might make its presence appear possible for a time, with a reduced area. When any true island thus located was quite beyond credulity, believers took refuge in the name "rock," and "Brazil rock" did not wholly disappear from charts until the middle of the nineteenth century, or perhaps a little later. Its American excursion may have been no more than a curious coincidence and an outcome of awakening interest in the New World: but at least

[1] Ayala's letter, *Orig. Nar. Early Amer. Hist.*, vol. i.; Nansen, *op. cit.*, vol. ii. p. 294, and most works treating of Cabot's voyages.

[2] Kretschmer, *Entdeckung*, etc., Taf. xv.

[3] *Ibid.*, Taf. xvii.

[4] Nordenskjöld, *Periplus*, Plate xxvii.

[5] Kretschmer, *Entdeckung*, etc., Taf. xix., No. 3.

[6] Winsor, J., *From Cartier to Frontenac*, p. 61, map.

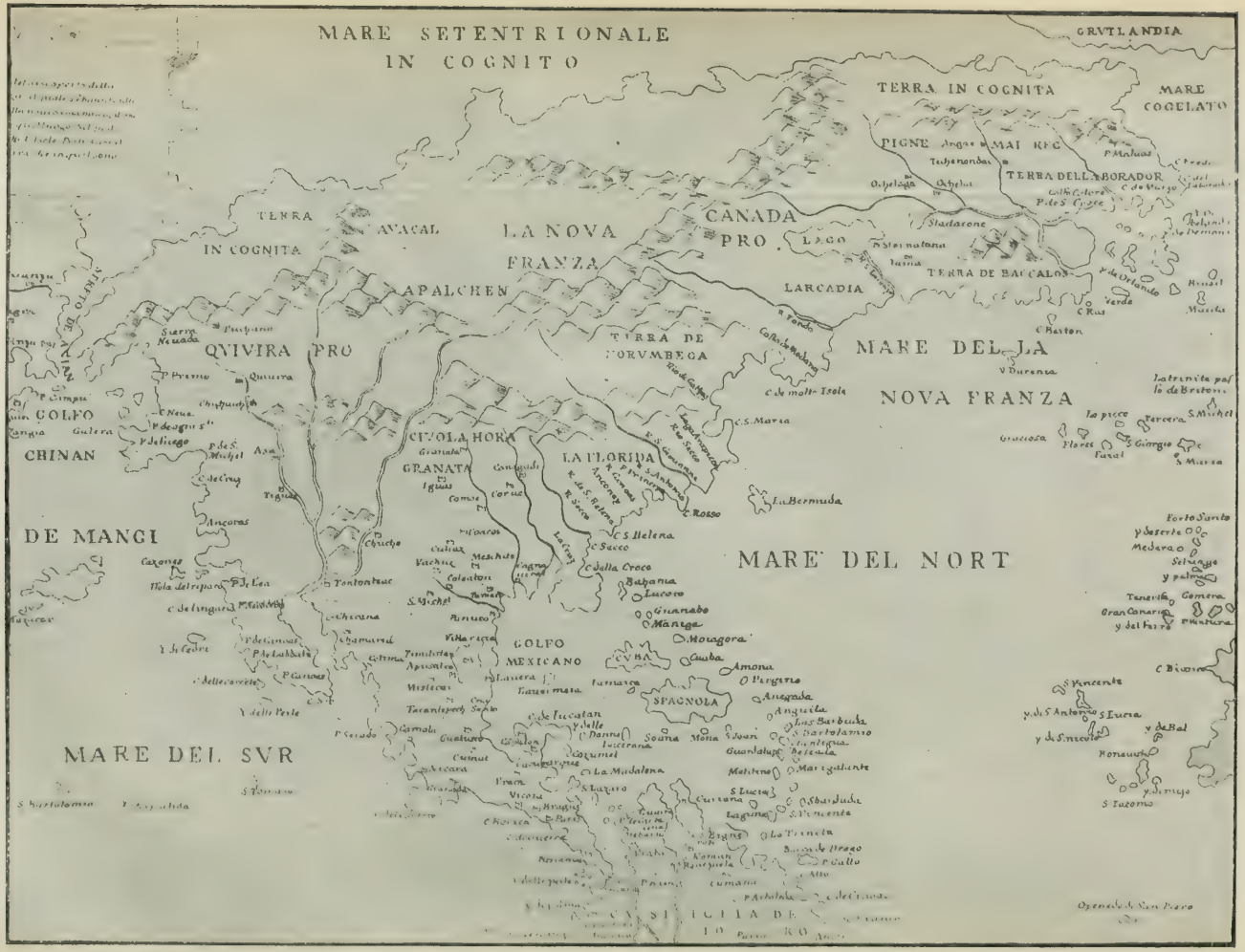

FIG. 2.—Zaltieri's Map, 1566. Note position of the island of Brasil, to the east of Terra de Baccalos.

it shows—by reversing the process—how a real American Brazil might previously become a map-appendage of Ireland.

Moreover, such shifting toward Europe of that part of north-eastern America with which we are chiefly concerned was actually and repeatedly effected in map delineations soon after the visits of Cabot and Corte-real. Kretschmer copies a Portuguese map of 1502, notable in other ways also as will appear later, on which a great island well over toward Norway and Ireland is marked Labrador—perhaps meaning Greenland—while not far west of it in the ocean is a coastal line with a scroll behind it to show uncertainty, outlying islands in front, and bearing the name Terra Corte Reall. Likewise Cantino[1] (1502) shows a forested Newfoundland far out at sea as Terra del Rey de Portugal.

The slightly later map of Sylvanus[2] (1511) is even more precise and explicit. A single large island, a square gulf, a bent shore-line, forming its border on the north-west and the south, and two narrow gaps very well representing the Straits of Belle Isle and the Straits of Cabot, can be understood only in one possible way; especially when we find the two regions thus divided bearing the names Terra Laboratorum and Regalis Domus. No one doubts that this is a sketch of Newfoundland, the Gulf of St. Lawrence, and the shore-land behind the latter. The location is almost as near Ireland as in most of the earlier and closer delineations of Brazil. Now, if Sylvanus in the sixteenth century could achieve such a total change of place, there should be no great difficulty in crediting a like error in the fourteenth century, when, presumably, there would be fewer checks and data.

The older Icelandic writings[3]—including the *Landnamabók* and the *Icelandingabók* of the twelfth century, and the Saga of Eric the Red (also called that of Thorfinn Karlsefne), embodying the Norse narrative of American exploration, the earliest surviving copy of which was made in the fourteenth century, but which contains portions evidently composed in the eleventh century—deal confidently with a certain Ireland the Great, described as westward from Ireland and near Wineland, the latter being reached by a described course southward (no doubt more exactly south-westward) from Greenland. Surely these geographic clues point to an American Great Ireland not very far from what we suppose to be the Brazil in question. The stories may be touched with fancy, but the best authenticated of them came to the very careful Are the Wise, who founded Icelandic historical literature, by the double channel of Thorfinn, Earl of the Orkneys, and one Rafn, who had dwelt at Limerick. Are, the historian, was a descendant of the missing man, Are Marsson. It is certainly no case of intentional romancing. The general belief in Great Ireland through several centuries is attested by other writers; and a passage in the above-mentioned saga demonstrates that it was at least sometimes understood to be near Markland, manifestly a part of the front land-wall of the Gulf of St. Lawrence.

[1] Nansen, *op. cit.*, vol. ii. p. 352.

[2] Winsor, J., *op. cit.*, map on cover, also within.

[3] Reeves, A. M., *The Finding of Wineland the Good*, quoting *Landnamabók* and other old Icelandic writings—copied more fully in Vigfusson and Powell's *Origines Islandicæ*.

Vigfusson[1] estimates from pedigrees and other entries the time of the supposed discovery of Are Marsson in that region as not long before the end of the eleventh century. The vessel which accidentally found him was from Ireland. Another, perhaps imitative, story is told in the ancient Eyrbiggia[2] Saga of a certain champion named Biorn, similarly found in an unknown land by one Gudleif sailing out of Dublin and tempest-driven far westward. The name Brazil does not seem to have effected a lodgment in Iceland; but the two geographic ideas are of kindred nature, and most minds will probably find in Great Ireland corroboration of the other.

In mediæval times there was a nearly universal belief in a single continental land-mass, for the northern hemisphere at least, made up of three connected members, with outlying islands far or near. Hence any newly found region was inevitably supposed, and called, insular, unless it could be taken for a roundabout attachment of Europe or an eastward protuberance of Asia. This tendency was so persistent that after the coasting of a long reach of South America had compelled the recognition of a New World, everything north of it from the West Indies to Greenland was often shown as though broken into fragments —for example, on the Lenox[3] globe (1510 or 1512), the maps of Boulanger[4] (1514), and Leonardo da Vinci[5] (1515), and elsewhere. Thus if the region of the St. Lawrence Gulf were shown at all, it would probably be as an island or islands.

(To be continued.)

PROCEEDINGS OF THE ROYAL SCOTTISH GEOGRAPHICAL SOCIETY.

At a meeting of Council held on the 11th of May Mrs. J. W. Kynoch, Keith, was elected an ordinary member of the Society.

The Late Mr. William C. Smith, M.A., K.C.

The following minute relating to the late Mr. Will. C. Smith was unanimously adopted:—

"The Council desire to place upon record their deep regret at the loss that they have sustained in the death of Mr. Will. C. Smith, M.A., K.C. Mr. Smith was one of the original members of the Society, and was elected a member of the Council in 1885. From 1885 to 1887 he acted as Honorary Librarian; in 1902-1903 as Honorary Treasurer, and he was one of the trustees of the Society from May 1902 till the time of his death. Throughout his connection with the Society he showed the most active interest in all its concerns. He was a very keen member of both the Gaelic Place Names Committees appointed by the Society; he lectured at the four centres of the Society in 1907 on 'The Mountains

[1] Vigfusson and Powell, *Origines Islandicæ*, p. 23.
[2] Morris and Magnusson, *The Saga of the Ere Dwellers.*
[3] Kretschmer, *Entdeckung*, etc., Taf. xi. [4] *Ibid.* [5] *Ibid.*

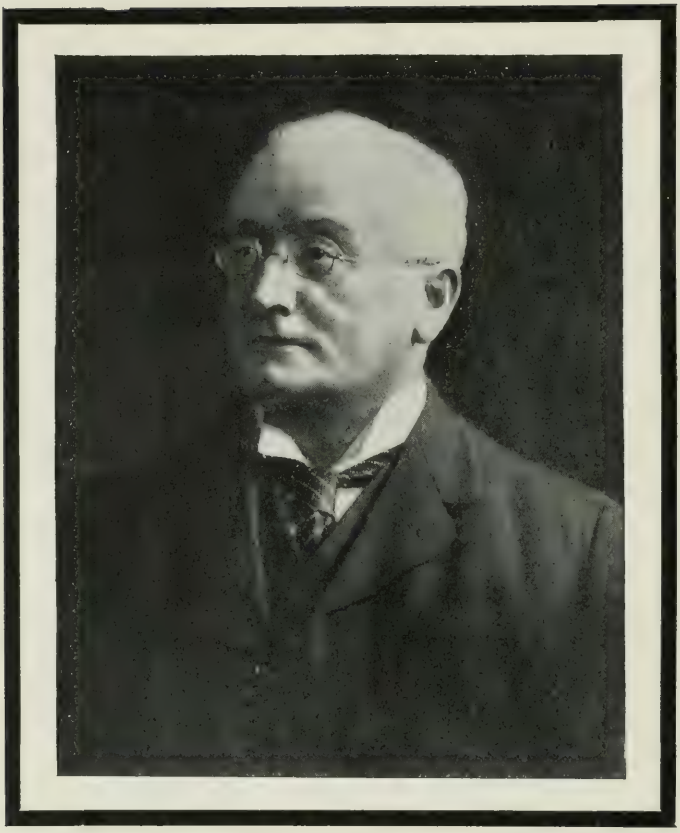

Photo by Lafayette.

THE LATE MR. WILL. C. SMITH, K.C.

of Scotland'; occupied the chair at numerous meetings of the Society, and again and again reviewed books on Scottish topography for the *Magazine*. In many ways his loss will be greatly felt."

OBITUARY.

William C. Smith, M.A., K.C.

(With Portrait.)

By the death of Will. C. Smith Edinburgh has lost a distinguished citizen, and the Royal Scottish Geographical Society a member prominent in the service and councils of the Society from its earliest days.

Mr. Smith joined the Society at its foundation in 1884, and had served continuously on the Council from the year 1885. He held the office of Honorary Librarian from 1885 to 1887, and of Honorary Treasurer in 1902-1903; he was also appointed a Trustee on 22nd May 1902. His eminent business capacities found full scope in the exercise of his various official duties, and were especially helpful in his work as a member of Council. A man of strong personality; a ready and incisive speaker, gifted with a remarkably clear and telling delivery, his powers of oratory, whether on the public platform or on more private after-dinner occasions, were of a high order. The happy allusion, the well-turned compliment, the humorous story, fell naturally into place among the more serious matters of a well-ordered speech. His gifts as a speaker were thoroughly appreciated by and of great service to the Society, and were shown on the many occasions on which he has taken the chair or moved votes of thanks at its public meetings. Of his legal career and political services this is no place to speak—they have met with due recognition elsewhere. Another side of his life seems, however, to call for special mention in these pages.

Few men had a greater love for the hills or a wider and more intimate knowledge of the scenery, topography and physiography of the Scottish Highlands than William Smith, a knowledge that was turned to good account in his lecture on "The Mountains of Scotland," given at the four centres of the Society in 1907, and in the detailed reviews of books dealing with Scotland which he contributed to the pages of the *Magazine* from time to time. He was a prominent member of the Scottish Mountaineering Club, of which he was President for three years from 1902. There are many who will recall with pleasure his delightful speeches in praise of mountains and mountaineering, delivered from the Presidential Chair at the annual dinners of the Club, and his cheery presence and genial leadership at the Easter Meets in the Highlands during his term of office. Though never a climber in the strictly technical sense of the word, he was a keen hill-man and a tireless walker. The *Journals* of the Scottish Mountaineering and Cairngorm Clubs contain the records of many of these mountain expeditions in "Skye, dearest of islands," and other parts of Scotland. The Cairngorm country, however, was always

that which he knew and loved the best, and many of his summer holidays were passed at Rothiemurchus or elsewhere in Strathspey.

Several unsigned articles from his pen have from time to time appeared in the columns of the *Scotsman*. In "Glenlyon" (Oct. 8, 1910) he speaks of that romantic valley in the "mysterious half-light of early Celtic life," and touches on the dramatic history of the glen during the long struggle of the Macgregors and the Campbells in western Perthshire. Sunrise from Ben Nevis was the subject of another article—"The Heaven-kissing Hill" (Aug. 26, 1908), and a third, under the title of "The Blue Mountains," gave a charming description of the Cairngorm range.

Mr. Smith's last public appearance in connection with this Society was on March 31st, when he proposed the votes of thanks, in his usual felicitous manner, at the lecture given by the Editor of this *Magazine* on the position of Serbia in the present crisis. It is peculiarly interesting to know that his daughter, Miss Lucy Smith (herself a keen mountaineer), forms one of that devoted band of Scotswomen who are now fighting the demon of typhus in the crowded hospitals of that sorely stricken country.

LIONEL W. HINXMAN.

GEOGRAPHICAL NOTES.

EUROPE.

Geography and Geology of Strathspey.—Memoir 74 of the Geological Survey of Scotland is devoted to the Geology of Mid-Strathspey and Strathdearn, and is by Messrs. L. W. Hinxman and E. M. Anderson, with contributions by Drs. Horne, Crampton and Flett, and Mr. Carruthers. Mr. Hinxman has already contributed an article on the river Spey to this *Magazine* (vol. xvii.), and all visitors to the numerous health resorts placed along the river will welcome this beautifully illustrated memoir, with its very full descriptions of the glacial phenomena which are so striking a feature of the district. Although, necessarily, the greater part of the space available in the paper is devoted to geology proper, yet the Introduction describes in some detail the more striking features of the physical geography, and much of the section on glaciation can be read with profit by those who have little special acquaintance with geological matters. The details are naturally beyond our scope here, but one or two points may be noted. Stress is laid upon the abnormally low gradient of the middle Spey, and upon the contrast in this respect between the main stream and its rapid tributary the Feshie. The Feshie for a considerable part of its course falls no less than 40 feet per mile, while the Spey between Balavil and Speybridge has a gradient of only slightly over 3 feet per mile. One result is that the tributary, when in spate, brings down more rock waste than the Spey can carry away, so that its wide alluvial cone below Invereshie is constantly increasing in size, and forcing the Spey over to the left, where it is eroding its bank in a curve concave to the mouth of the

tributary. Again, the tributary holds up the waters of the main stream, and is largely responsible for the continued existence of Loch Insh. The point is of much interest, for Loch Insh is but a remnant of a larger lake which once extended at least as far up the valley as Kingussie, and was due to the ice from Glen Feshie blocking the drainage of an ice-free portion of the main valley. The present Feshie river is thus continuing, in modified form, the work performed by the glacier which preceded it. The memoir is full of interesting little points of this kind which will appeal to those familiar with the neighbourhood. We can note only one other, the suggestion that the corrie on the north side of Ben Macdhui, at a height of 3700 feet, may have lodged the last of the hanging glaciers of the Cairngorms.

A note accompanying the memoir states that the issue of the accompanying map (Sheet 74) has been delayed owing to the war.

Asia.

The New Plant Cover of Taal Island.—The low volcano of Taal, in the centre of lake Bombon in Luzon, was in active eruption a few years ago, the paroxysm culminating in January 1911 in a destructive outburst, which we described here in vol. xxvii. p. 546. As indicated in that article the plant cover was virtually destroyed by the ash and poisonous gases. Since the great outbreak, which was accompanied by much loss of life, the American Government has prohibited all residence on the island volcano. As it is thus freed from human interference, the renewed growth of plants on the surface of the island presents the same features as the much studied case of Krakatoa. Mr. Frank C. Gates has investigated the new flora with much care, and his results have appeared in the Philippine *Journal of Science*, and are discussed in abstract in the *Revue Générale des Sciences* for April 15 last. For more than a year after the great eruption the surface of the island remained naked, but with the beginning of the second rainy season plants began to reappear. By the end of the third rainy season after the catastrophe almost the whole northern third of the island was re-clothed, but elsewhere plants were found only in a few rare localities. A few plants grew from stocks buried in the mud, but the vast majority were immigrants from the surrounding shores of the lake. The first arrivals were water-borne, and took root upon the shore. Next came the seeds of grasses carried by the wind. These developed rapidly and formed meadows, which attracted bird visitors, and with the birds came the seeds of bushes, low trees, and climbing plants. The ejecta of the original eruption were carried over the lake to its west and south-western shores, and these in consequence were devastated like the island. Thus the south-west winds brought no seeds, and the result has been that the south of the island has been slow in re-acquiring a plant cover. On the other hand, the north-east monsoon, blowing from a region little affected by the eruption, brought with it many seeds, and thus the northern part of the island has been the first to become clothed. By April 1914, approximately three years and three months after the eruption, 179 vascular

plants were noted, but, in marked contrast to the conditions on Krakatoa, it was found that ferns and their allies were few. This is due to their scarcity in the surrounding region, to the dryness of the climate, and to the slight elevation of the volcano. Dicotyledonous plants form the majority, 138 out of the total number observed. Mosses, lichens, and algae were all found to be poorly represented.

Africa.

Political Geography of Africa.—Sir Harry H. Johnston delivered to the Royal Geographical Society, in February last, a very outspoken address entitled "The Political Geography of Africa before and after the War," which appears in the *Geographical Journal* for April. In this article the author attempts to forecast the probable appearance of the political map of Africa at the close of the war, and incidentally discusses the chief products of the continent, the distribution of the germ diseases affecting man and domestic animals, the probable future development of railways, and similar questions. The article is illustrated by a very fine series of maps, to which the attention of members may be especially directed; that showing the existing and projected railways and the inland waterways notably contains a large amount of material not otherwise easy of access.

Reafforestation in Algiers.—A note in the *Revue Générale des Sciences* for March 30 summarises a recent Government report upon forestry work in Algiers. Planting was begun in 1851, but it is only since 1880 that it has been carried on with activity and method, and until 1910 the task of the foresters was limited to replacing trees cut down in areas previously classified as forest. Since that date, however, the attention of the administration has been directed to the creation of new forest areas, especially in the hilly regions, where increasing destruction of the cover is threatening to produce the usual results in flooding, landslips, loss of the surface soil and so forth.

Between 1851 and 1910 about 13,500 acres were replanted. Of this total about half bears mixed woods, while in the remainder pure plantations of cork oak and of Aleppo pine vastly predominate. Comparatively small areas are devoted to pure plantations of eucalyptus, Australian acacia, and cedar, while ash and chestnut have been planted on what are little more than experimental plots. The preference for the Aleppo pine is due to the hardy nature of the tree and to its abundance in the country, while the cork oak is the most valuable species to be found in North Africa. The chief obstacle to afforestation is not the nature of the soil but the summer drought, which is very destructive to young plants, and makes it necessary to undertake all operations of sowing and planting in the autumn, after the first rains, so that the young plants may be as well established as possible before the summer comes.

General.

The British Association.—The Sectional Presidents for the Meeting of the British Association which is to be held in Manchester,

from September 7 to 11 next, have now been appointed. Section E (Geography) is to be presided over by Captain H. G. Lyons; Section C (Geology) by Professor Grenville Cole; Section F (Economics) by Dr. W. R. Scott, and H (Anthropology) by Dr. C. G. Seligmann. Professor Arthur Schuster is to be President of the Association. It has been decided that the proceedings of the meeting shall be confined to scientific work; the usual social functions will not be held.

Origin of Coral Reefs.—Professor W. M. Davis of Harvard spent a considerable part of the year 1914 in visiting a number of islands in the Pacific Ocean with a view to testing the various theories which have been put forward to account for the origin of coral reefs. His full report is to appear, probably, in the *Bulletin* of the Museum of Comparative Zoology at Harvard College, but a preliminary statement is to be found in *Nature* for April 15. In this report Professor Davis emphasises the necessity for a geological as distinguished from a zoological investigation of the problem, and especially for a detailed study of the shore-lines of the islands surrounded by the reefs. Thus an "embayed" shore-line is proof of subsidence, even if the subsidence has been followed by elevation at a later stage. His study of the shore-lines in the islands visited, and of the coast-line of Queensland in the case of the Great Barrier Reef, leads him to support Darwin's view that reefs and atolls owe their origin to subsidence of the sea-floor. To the brief statement of his general conclusions Professor Davis adds short notes on the local conditions in certain localities. His full report will be looked forward to with interest.

Mean Sea-level and its Fluctuations.—Professor D'Arcy W. Thompson contributes to the *Scientific Investigations* of the Fishery Board for Scotland (1914, iv.) a very elaborate paper on the determination of mean sea-level, and on the causes of the observed fluctuations. He finds as a result of his investigation that the apparent fluctuations from year to year in mean sea-level are not merely local phenomena, but are similar in separate and distant localities. Thus there is a close similarity in the fluctuations at Dundee and at Aberdeen, and these, with certain notable differences, resemble the fluctuations observed at German and Danish stations, while, with a year's retardation of phase, the results at Milford Haven can also be correlated with the Scottish figures. The causation of the phenomenon is obscure, but it is certainly complex. Among the factors are meteorological influences, possibly rainfall, and certainly barometric gradient; probably changes in the great ocean currents; minute oscillations of the earth's axis, and, to probably a small extent, long-period astronomical tides. In addition, two other important conditions have to be borne in mind: "(1) the existence of interference phenomena, or 'beats,' resulting from the interference of ordinary well-known tides of moderate period; and (2) the possibility, or rather probability, that a part of the apparent phenomena is spurious, and due to our selection of a certain artificial period (calendar month and calendar year) for the determination of our means."

As regards possible practical bearings of the question, Professor Thompson says: "Though the connection of this fluctuation of sea-level with fishery problems may be remote, it is at least conceivable. A difference in the level of the North Sea amounting to somewhere about six inches on the average between May and December, or a change in the whole annual mean sea-level of say three to four inches from one year to another, must involve the transference of an immense body of water, and must appreciably affect the composition and the salinity of the sea itself. It forms some part at least of that complex phenomenon which we seek to study in our hydrographical investigations, and which we may be able some day to correlate with periodic phenomena in the life history and the fluctuating abundance of our food fishes."

EDUCATIONAL.

Summer School at Bingley.—The Education Committee of the County Council of the West Riding of Yorkshire has arranged a summer vacation course for teachers, to be held at Bingley Training College, from August 4 to 18 next. Four evening lectures will be given during the course, including one by Mr. Mackinder on how much geography and history can be taught within the limits of the elementary school. For further details application should be made to the Education Department, County Hall, Wakefield.

Geographical Lectures at the Imperial Institute.—Dr. H. B. Gray, formerly headmaster of Bradfield College, has recently been appointed official lecturer at the Imperial Institute in order to give short lectures on the resources of the countries of the Empire. During March and April Dr. Gray delivered a series of lectures, chiefly to schools in London and its neighbourhood, in connection with the school teaching of the geography of the Empire. The lectures were illustrated by the collections of exhibits on view in the public galleries of the Institute at South Kensington. During the past month Dr. Gray has been giving lectures of a less formal kind, intended for members of the general public, in connection with the exhibits illustrating the present condition and the resources of the Colonies and of India. A further series will be delivered during June. No charge is made for admission, which is by ticket, obtainable at the Imperial Institute.

NEW BOOKS.

EUROPE.

The New Map of Europe, 1911-14. By Herbert Adams Gibbons, Ph.D. London: Duckworth and Co. *Price 6s. net.*

Only when the sub-title, "A Study of Contemporary European National Movements and Wars," is added, do we recognise the full significance of this

valuable and highly suggestive work. It is true that the main interest of the book is political rather than geographical, but racial rivalry, irredentism, the desire for expansion, are ultimately based on geography. Changes have been taking place in the map of Europe, and in these changes lie the causes of the present conflict. The map has to be remade. The Germanic Powers would wish the alterations brought about according to their plans; the Allies are fighting to thwart the desire which would, if it were allowed full sway, crush the spirit of democracy and of nationality.

The author writes in most cases from personal experience, and on this account his work is valuable to us. This applies more especially to the chapters (viii.-xi. and xiv.-xix.) which deal with the Near East Question. In none of the many books written recently about the origins of the War do we find a fuller, more accurate, more intimate knowledge of the problems of south-east Europe, where have arisen the issues which have set the Continent aflame. We have read the volume with pleasure and profit, and wish to give it an emphatic recommendation.

It may not, however, be amiss to point out a few corrections which might be made in the text. On p. 15, l. 23, "thay" should read "they"; on p. 25, l. 21, "broker" might be substituted for the less-familiar "courtier"; on p. 60, l. 24, "Saladin" might be put for "Saladdin"; on p. 100, l. 9, "proffered" should be inserted for "proferred"; on p. 135, l. 17, "which" might be changed; on p. 137, l. 33, "repressions" should read "repression"; on p. 154, l. 31, read "newspaper" for "newspapers"; on p. 163, l. 4, read "Macedonia" for "Rumania"; on p. 198, l. 15, the "her" is unrelated; on p. 263, l. 3, "west" should read "east"; on p. 310, l. 17, "Vardar" should read "Struma"; on p. 340, l. 1, "to" might be altered. These and a number of other minor errors are in all probability due to rather hasty writing, a fault readily condoned in these times of pressure.

Russia and the World: A Study of the War and a Statement of the World-problems that now confront Russia and Great Britain. With Illustrations from Original Photographs. By Stephen Graham. London: Cassell and Co., 1915. *Price* 10*s.* 6*d. net.*

Mr. Stephen Graham must be ranked as one of the leading literary factors in promoting the present pleasant *rapprochement* between the people of Britain and Russia. He has a warm heart for both countries, a fascinating style, and is so winning in his descriptions of Russian life that we seem to be quite at home in the vast empire. The work before us begins naturally with war pictures. Mr. Graham was staying in an Altai Cossack village on the frontier of Mongolia when the war broke out. He describes the Cossacks in that far-off village, thousands of miles from the fighting line, joyfully making ready to go to the front. Mr. Graham went with them, and gives us an account of what he saw in Moscow in September 1914. "I found no depression of the natural spirit in Russia; no strikes, no riots, no revolutionary propaganda or pessimism, but instead an all-pervading cheerfulness and national unanimity which even the most optimistic could not have foreseen. The peasants go to the front with great enthusiasm; and the *intelligentsia*, radical and conservative alike, cheer them on. The newspapers of all parties are at one, and the Liberal organs are as loyal as those of the extreme Right. There is the same unanimity among the Poles and the Jews—volunteer regiments have even been formed. . . . The air is full of hope. All vodka shops have been closed, and Russia, at a word from the Tsar, has taken on the appearance of sobriety. It has been impossible to obtain alcoholic liquors of any kind,

and as a consequence drunkenness has disappeared from the streets, and with it a great army of beggars, who only beg that they may gather twenty kopeks for a bottle. The absence of vodka made a great blank in the peasants' lives, but that blank has been filled up by the war and the interest of the war. Ordinarily the peasants feel they have nothing to do but drink, but now it is otherwise. It is as if in war they found a real reason for existence, as if in death they found the object of living. It is difficult to reconcile war with our Western Christianity, but the Church of Russia finds no difficulty—going to the war is laying one's body on the altar of sacrifice. In the fine rage of the Russian soldiers going to meet the foe lies the thrill of exultation in the souls of martyrs going to a glorious death."

Further on there is the following tribute to the Tsar :—"The Tsar's life and personal character are a mystery. He is beyond definite comment in his own country. Unless he shows himself, no one can say what he is. It remains till now to make a fair estimate of his ideals and his passions. The Tsar to-day has outlived the accusation of insincerity, has outlived all his unpopularity, and has given the lie to all that has been said against him. He has no doubt gone through great spiritual evolution in these parlous and suffering times. His mind has been working all the time, and to-day he emerges as a great serious monarch whose entire thought and continuous anxiety has been 'What must be done to save my people from their dangers, and to put them on the high road of a great destiny?'"

We have no hesitation in recommending this book to those who wish to read about Russia and the Russians in the most agreeable manner, and we are confident that its perusal will strengthen their sympathy for the great nation now so gallantly fighting as our ally in the present war.

History of Scotland. By Professor R. S. Rait. Home University Library. London : Williams and Norgate, 1914. *Price* 1s.

No. 100 of this series of original volumes is a specially interesting one. In telling once more the oft-told history of our country, Professor Rait does not try within a space of 235 small octavo pages to furnish a continuous narrative. He adopts the far more illuminating plan of separate chapters, each of which traces the evolution of one or more of the many interwoven elements in our national life. The result in his capable hands is a valuable and well-balanced book, which does credit both to the writer's width of knowledge and his discrimination. It is moreover excellent reading.

The longest chapter is devoted to "The Church" and the next longest—almost equal—to "Agriculture and Commerce," a division which shows a just appreciation of the national character. Other chapters are "The Nation," "The Crown," "The Family and the Clan" and "The Parliament." It is difficult to discriminate where the work is all so good, and each reader will probably prefer the portions dealing with his favourite subjects. Personally we are inclined to give the palm to the short chapter on "The Family and the Clan" because of its clear exposition of this much misunderstood subject, its valuable illustrations and its antiquarian lore. But "The Church" will possibly attract most votes by reason of its fulness of information and fairness of statement. It is an admirable and calm résumé of the most vexed subject in our annals. Professor Rait brings out well our little-acknowledged debt to England both in our religious and legal standards.

A Chronological Table, Note on Books, and Index complete the work, the value of which is not to be measured by its price.

ASIA.

In the Lands of the Sun: Notes and Memories of a Tour in the East. By H.R.H. Prince William of Sweden. London: Eveleigh Nash. *Price* 16*s. net.*

Prince William of Sweden went out to Bangkok, accompanied by the Princess and their suite, to be present at the coronation of the King of Siam. The Prince managed to combine with his ceremonial duties a certain amount of sport and sight-seeing, and, on his way home, made a hasty run across Northern India. He has set down his impressions in a book which contains a pleasantly written account of his travels, for the most part over well-beaten tracks. The Prince recounts his experiences in a very modest and unostentatious fashion which wins the sympathy of the reader, while conveying a good deal of solid information concerning the places and people visited.

The coronation itself, which furnished the main object of the Prince's trip, is described at length, and one feels that it must have been a bit of an ordeal for the young King of Siam. Educated mainly in England, he had passed through Oxford and Sandhurst, and served in the British army. It is easy to imagine that the long-spun-out and somewhat barbaric ceremonial must have been a fatiguing performance for the principal actor. But his people enjoyed it, and Prince William came to the conclusion that they would have liked to crown their king several times over. Prince William learned during his stay in Siam to know the king as a man of progressive ideas, whose first thought is for the welfare of his country, and we get a pleasant picture of the home life of the queen-dowager, the widow of the late King Chula Longkorn, in her country place outside the city of Bangkok. The author no doubt intends to be complimentary to the queen-dowager when he says that, "with her clear head and good sense, she may come to play a similar rôle in Siam to that of the old Dowager-Empress of China."

The Siamese were most attentive to their royal Swedish visitors, and they strained their resources to do them honour, making and repairing roads and bridges for a sporting trip up the country, and building hunting-lodges for the Prince and his suite.

A chapter of the Prince's book is devoted to a brief historic sketch of Siam and its people. The religion, of course, is Buddhist, and the Prince also has a chapter containing in few but well-chosen words what he has learned of Buddhism and the life of its founder.

From Siam the party went on to Saigon, in French Indo-China. The original intention was to visit the ruins at Angkor, in Cambodia, but the attractions of a shooting-trip proved too much for the Prince, and he left the Princess and some others of the party to "do" Angkor. A very good account of the magnificent ruins is contributed to the book by Chamberlain Bildt. A remarkable similarity exists between the ancient ruined temples found in places so far apart as Java and Cambodia. In both countries they no doubt owe their existence to Hindu influence. We believe that they date from about the ninth century of our era, and the splendid scale upon which the temples at Boero Boedor in Java, and at Angkor in Cambodia, are built points to their being the remains of a more heroic age than the present.

The account of the Prince's return journey through Northern India calls for no special comment, save that he seems to have made the most of the brief time at his disposal, and that his notes make an interesting conclusion to a very readable volume of travel.

The City of Dancing Dervishes: and other Sketches and Studies from the Near East. By HARRY CHARLES LUKACH. London: Macmillan and Co., 1914. *Price 7s. 6d. net.*

The sketches and studies contained in this volume appeared in various periodicals, and have been gathered by the author into a book with the above title. The City of Dancing Dervishes is Konia, the ancient Iconium, the city to which it is said the Turkish Government have transferred the state archives, in the event of it being necessary to evacuate Constantinople. Mr. Lukach writes from personal observation, and with a vivid pen. He has made himself acquainted with the country and the lore of Asia Minor. Curious customs that prevail are delightfully told, and old traditions are rehearsed. Not the least interesting of his sketches is that of the False Messiah, who on his pretensions being put to the test of his becoming a target for archers, immediately renounced his claims, and became a Mohammedan, residing to the end of his days in the Sultan's Court. Mr. Lukach is not only a traveller in, but a student of the Near East; and his studies bearing on the Turk and his dominions have a present-day interest. His book is enhanced by some excellent photographs taken by the author.

AMERICA.

Seven Years on the Pacific Slope. By Mrs. HUGH FRASER (author of *Reminiscences of a Diplomatist's Wife in Japan*) and HUGH C. FRASER. With Illustrations. London: T. Werner Laurie, Ltd., 1915. *Price 12s. 6d. net.*

All who remember Mrs. Hugh Fraser's book on Japan will take pleasure in reading her account, written in collaboration with her son, of a settler's life in the State of Washington. The geographer will not find in it much of technical interest, but he and the general reader will much enjoy the bright and humorous narrative. Owing to governmental apathy prospects in the Methow valley are not too rosy, and what compensations it possessed for the authors seem to have been created by their own sunny temperaments. The other inhabitants are presented to us in a very favourable light, and if they read the book, they will probably not scrutinise too carefully the shadows. We confess that some of the anecdotes appear almost outrageously incredible, but they are always amusing, and no doubt they are true in a "pragmatical" sense. The character-drawing is indeed a feature of the book, and with Mrs. Fraser we like nearly all the people although we do not always approve of them.

With the Bible in Brazil: Being the Story of a Few of the Marvellous Incidents arising from its Circulation there. By FREDERICK C. GLASS. London: Morgan and Scott, 1914. *Price 2s. 6d.*

In twenty chapters Mr. Glass describes incidents in his work of Bible circulation in Brazil. He does not possess the charm of narrative with which George Borrow could adorn his story; but, in the manner of a plain, unvarnished tale, he describes his experiences, which themselves are of sufficient interest to cast their spell on the reader. He throws light on Brazil and its people from an angle of his own, and helps one to understand something of the possibilities of this land, which needs so much the light of the life-giving Word. The book is furnished with a map of Brazil and numerous illustrations.

Round the World in Strange Company: America, British Columbia, and the West. By Nicholas Everitt, F.Z.S. Illustrated. London: T. Werner Laurie, Limited, 1915. *Price* 12*s.* 6*d. net.*

This is a pleasant and chatty book giving some account of travel in the United States and Canada. The most interesting parts are, perhaps, those which give the author's impressions of Salt Lake City and district, which are not so much visited as some other parts of North America. Generally speaking, however, the book only deals with familiar ground. It would form a pleasant companion for an idle hour.

GENERAL.

Geology of To-day. By Professor J. W. Gregory, F.R.S. London: Seeley, Service and Co., Ltd., 1914. *Price* 5*s. net.*

Professor Gregory brings together in these pages a variety of geological and geographical matters in a popular way, and supplements the text with many beautiful photographs of real and partly imaginative places and things. He discusses the birth of the earth and the geology of the interior, earthquakes, faults, volcanoes, mountain chains, the age of the earth, the dawn of life and the geological history of plants, animals and man. There is still room for discussion on the more speculative points in such a comprehensive field, and it is not likely that geologists will agree with all the author's conclusions. At page 151 we read, "Fiords are one among other features resulting from the vertical movements of the earth's surface; they occur where wide areas of old rocks have been gently and slowly upheaved. The upheaval cracks the crust along two series of intersecting lines: the cracks in each of the two series are approximately parallel. . . . In all the fiord areas the fiords and their valleys are arranged in a network; while on the margins of the areas the main fiords and fiord channels are usually arranged in curved concentric series." This statement is one that is not based on a solid foundation of observed facts and correct inference, and the author's well-known views that fiords are the result of earth movements, and not erosion, are not likely to meet with much acceptance among present-day geologists. No doubt a few fiords like the Great Glen follow lines of fault, but these are generally old lines of weakness, some of them of palæozoic age, and there has been no movement of the earth's crust in their vicinity for ages. During the process of erosion, the land has been more easily worn down along such weak lines on the surface than at other places, and if the water originally running down a slope to the sea found a shattered belt of rock along the general direction of its course, it would take advantage of this and scoop out its channel along the line of least resistance. But to maintain, as the author appears to do, that there has during the late Tertiary period been a violent series of earth movements and complicated local fracturings of the crust at those places where fiords exist, is to take up a position that we regard as unwarranted by the facts that have been collected in many countries.

At page 152 the statement occurs that "The great rivers of the world flow eastwards." The author excepts the rivers in the western plain of Siberia, north-eastern Europe, the Nile, Congo, Orange River, Indus and the Murray River in Australia. But he has forgotten the Volga, Rhone, Loire, Mississippi, Colorado, Mackenzie and Yukon, and, if all the exceptions be considered, there is not much left of the rule, and therefore any conclusions based on such a slender foundation cannot be considered of much value.

The last chapters are descriptive of the history of life on the earth, and here the text is illuminated by drawings of many ancient inhabitants from those of the Permian age onwards. The remarkable monsters of the Jurassic and Cretaceous ages are beautifully depicted in chap. xviii., and these illustrations greatly add to the interest of the text.

EDUCATIONAL.

The Oxford Geographies: A Geography of Australasia. By GRIFFITH TAYLOR, B.Sc., B.E. (Syd.), B.A. (Cantab.), F.G.S. Oxford: At the Clarendon Press, 1914. *Price* 1*s.* 6*d.*

It has to be said at once that this book furnishes an accurate survey of Australia, New Zealand, Tasmania, Papua, the Fiji Islands, and the Solomons. The writer is, in more senses than one, perfectly at home in his subject. Hence we meet with no vague generalisation or badly arranged facts. Mr. Taylor has already written an authoritative book on Australia, and is known in another sphere than that of an author. In the work before us physical, climatic, and economic conditions are all fully and scientifically dealt with, and if it be necessary to single out any portion for special praise, that praise is due, we think, to the treatment of climate. We can thoroughly recommend the volume, both to the teacher and to the general reader.

An Introduction to General Geography. By ALEC A. GOLDING, B.Sc. Cambridge: At the University Press, 1915. *Price* 4*s.*

The chief value of this work lies in its clearness. The text takes the form of notes rather than of full and logical treatment of principles, and as such must prove of assistance to a busy teacher or to one who is studying with a view to acquiring within a fairly short time a knowledge of the facts of modern geography. Here and there slight inaccuracies occur, the result, we imagine, of the desire for conciseness of expression and condensation of matter. Still these do not mar the value of the volume, for it supplies a great amount of information in an attractive, clear way. Some sections are very well done—*e.g.*, Chapter iv., The Crust of the Earth; Chapters vi., vii., and viii., Climate; Chapter xiv., Deposition of Detritus; and Chapter xxi., Towns. Special mention should be made also of the figures, which are just what a pupil needs.

Highroads of Geography. Book VI. *The British Isles.* London and Edinburgh: T. Nelson and Sons, 1914. *Price* 2*s.*

The "Highroads of Geography" Series is just as welcome and as helpful as the companion "Literature" and "History" series were. Book VI. has two parts —the first is entitled "A General View," the second "A Regional Survey." Needless to say the name of Nelson is sufficient guarantee that the format of the book will appeal to the youthful reader. The coloured pictures are excellent reproductions, the type is clear, the style in keeping with the subject, and suited to the needs of the pupils. Happy are the young students who are privileged to handle, read, and use such an introduction to the geography of our islands.

The Atlas Geographies. Part IV. *Commercial Atlas Geography.* By THOMAS FRANKLIN, A.C.P., A.R.S.G.S., and ERNEST R. SHEARMUR, B.Sc. (Lond.). Edinburgh and London: W. and A. K. Johnston, Limited, 1914. *Price* 3*s. net.*

The former volumes of this valuable series have already been favourably reviewed; the present work undoubtedly keeps up the reputation of its predecessors. After two excellent chapters on the world as a whole, the rest of the book occupied by seven chapters dealing with the British Isles, Europe, Asia, Africa North America, South America, and Australasia. In the treatment, physical and climatic conditions, in so far as these influence productions, trade and commerce are given due attention. Among the many illustrative maps and figures, we must especially note the ten maps showing the world distribution of the various com-

mercial commodities, the climate maps, and figs. 16, 17, 25, 26, 27, and 28. The information given is accurate and up-to-date, the style clear, and the general appearance of the book attractive.

BOOKS RECEIVED.

Joseph Pennell's Pictures in the Land of Temples. Reproduction of a series of Lithographs made by him in the Land of Temples, March–June 1913. Royal 8vo. With 40 Illustrations. *Price 5s. net.* London: William Heinemann, 1915.

A Short History of Belgium and Holland. By ALEXANDER YOUNG. With 77 Illustrations. Demy 8vo. Pp. 586. *Price 5s. net.* London: T. Fisher Unwin, 1915.

A Short History of the Sikhs. By C. H. PAYNE, M.A. With Illustrations and Maps. Crown 8vo. Pp. 284. *Price* 1 *Rupee* 8 *Annas net or* 2*s. net.* London: Thomas Nelson and Sons, 1915.

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Burma District Gazetteers, 2 vols. Rangoon, 1914.

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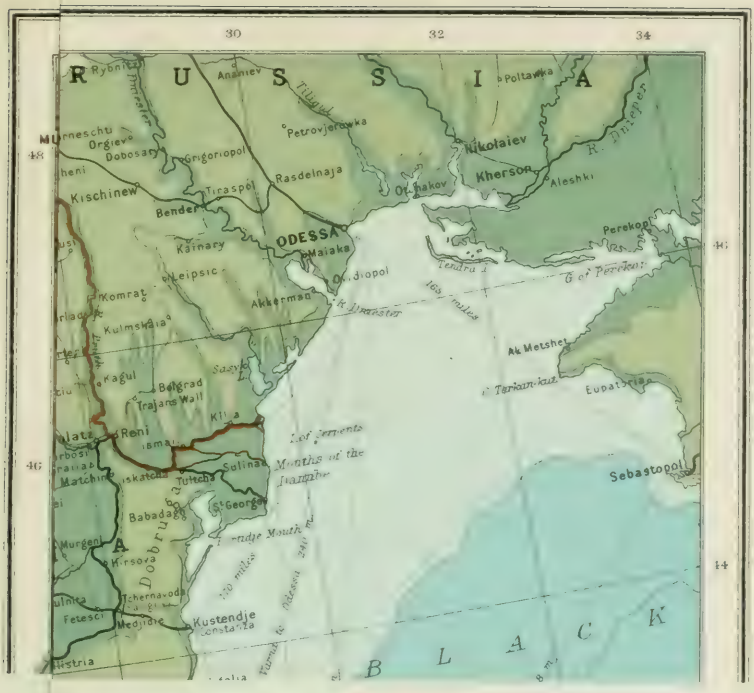
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OROGRAPHICAL MAP OF THE BALKAN REGIONS

Photo by Thomson, London.

SIR DOUGLAS MAWSON.

THE SCOTTISH GEOGRAPHICAL MAGAZINE.

THE AUSTRALASIAN ANTARCTIC EXPEDITION, 1911-14.[1]

By Sir Douglas Mawson, D.Sc., B.E.

(With Portrait, Illustrations and Sketch-Maps.)

The object of the expedition was to investigate the Antarctic Continent to the southward of Australia, a region where the continent was supposed to extend far to the north, but concerning which only the most scanty information was at hand. Most of the expeditions of late years have had as their objective the South Pole. Consequently, in order to secure the most promising route, their fields have much overlapped, and the area of the unknown has not diminished commensurably with the magnitude of those undertakings. There is still a vast unknown area at the southern extremity of the globe, and now that the Pole has been reached, it is hoped, in the interests of science, that no further consideration will arise to cause future expeditions to follow upon each other's tracks, until at least a superficial knowledge of the whole has been attained.

The Start.—Our headquarters in the Commonwealth was Hobart. From there the *Aurora* sailed on December 2, 1911. Our good fortune commenced almost immediately, for a violent gale was weathered off the Tasmanian coast without any more serious consequence than the loss of half the bridge and slight damage to the motor launch. Deeply laden as we were, the decks lumbered with cargo, we had every reason to

[1] Sir Douglas Mawson was unable, owing to the outbreak of the war, to lecture before the Society during last winter session, as was hoped. He has, however, kindly sent to us a number of photographs, from which those which accompany this article have been selected. The article itself is reprinted, in a slightly abbreviated form, from the *Geographical Journal* for September 1914, and formed the address delivered by the author before the Royal Geographical Society in London.—Ed. *S.G.M.*

congratulate ourselves on the *Aurora's* sterling sea-going qualities, and on the abilities of Captain Davis and his staff.

Macquarie Island, a sub-antarctic possession of Tasmania, situated in the same latitude as South Georgia, was sighted on December 11. There

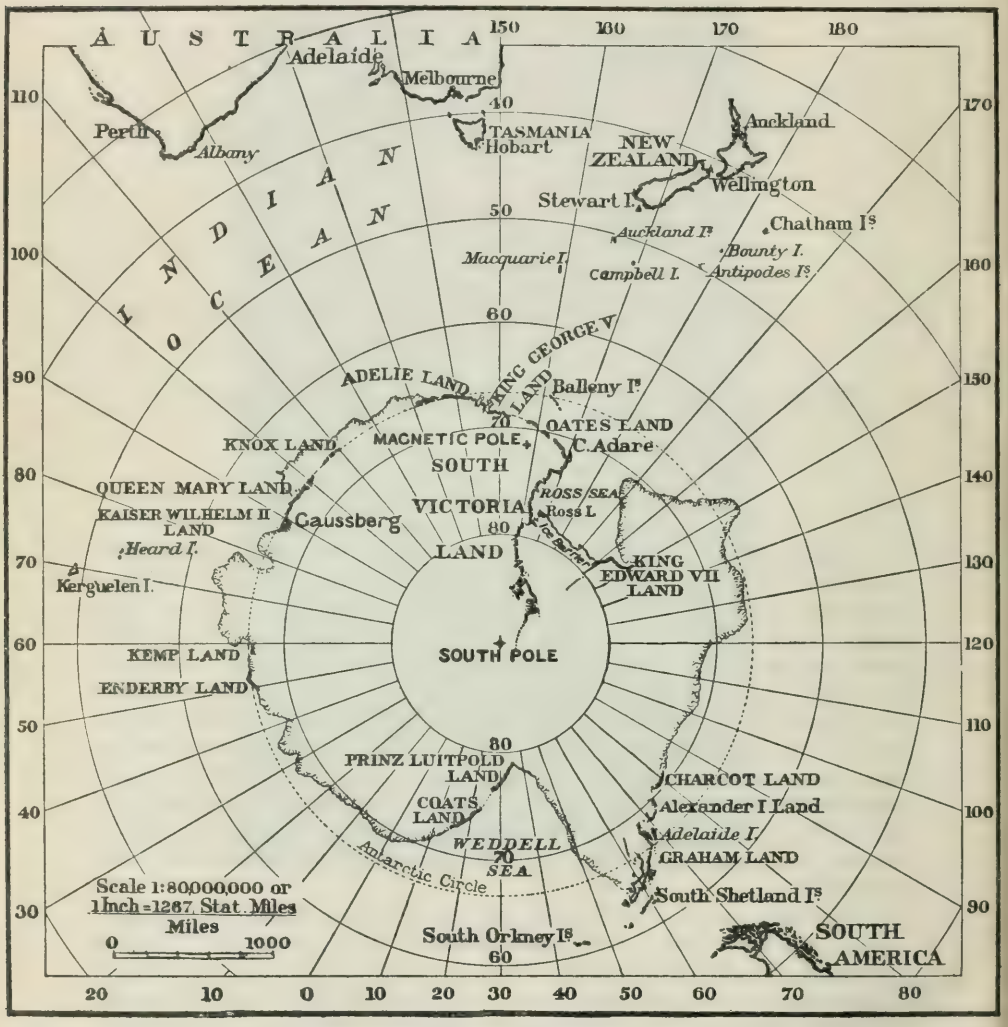

FIG. 1.—The Antarctic regions as known at the present time.

exists there but one main island around whose shores are many rocky reefs and islets. Rocks also appear for many miles to the north and south, rising from a submarine ridge, which is the submerged continuation of the main island itself. The habitable island has a length of over 20 miles and a greatest breadth of $3\frac{1}{2}$ miles. The chief vegetation is

tussock grass and Kerguelen cabbage, but the island abounds in a truly wonderful population of birds and animals. At one time it was a favourite haunt of the valuable fur seal, but for fifty years or more only odd specimens have been seen. The ruthless slaughter by the early sealers is responsible for this almost complete extermination. Sea elephants, however, are numerous, the bulls being met with up to 20 feet in length and weighing probably some two tons.

Very little accurate information was available concerning the island, and the only available map preceding Blake's survey was a sketch made by a sealer. Rumours of the existence of wingless parrots and other continental forms of life indicated that perhaps Macquarie Island was the last remaining summit of a vast sunken southern land. Other evidence also suggested that probably at one time such a land existed uniting Australia with the Antarctic Continent. There was, indeed, an interesting field for scientific work.

A preliminary examination of the island was conducted preparatory to settling the site for a permanent station. This was eventually chosen on a low neck of land at the north end of the island. There a hut, coal store, and instruments for a year's occupation were landed, in which work our excellent motor launch proved most valuable. Next the masts, stays, engines, apparatus, and materials for constructing a receiving hut and an engine-house were landed at an adjoining spot below a precipitous hill. Eventually the wireless station was erected on the summit 350 feet above sea-level. To transport all the gear from the sea-shore up the cliffs to the summit was a difficult piece of work. Under Wild's able guidance, however, it was accomplished, use being made of a "flying fox" stretched from the summit to the strand. Even the landing of materials was no mean work, for there are no harbours at Macquarie Island, and situated as it is in a windy belt, the roadsteads are not as serviceable as they would be under different climatic conditions.

A small steamer, the *Toroa*, chartered to carry coal for us as far as Macquarie Island, arrived and replenished the *Aurora's* bunkers before the latter continued her southward voyage. To effect this the two ships were anchored a quarter of a mile apart, and the coal transported in whaleboats and the motor launch. On arrival at the island we discovered a shipwrecked party whom we succoured and sent back to civilisation by the *Toroa*. The remains of their vessel, the *Clyde*, lay almost high and dry on a reef in North-East Bay, near our station. On Christmas Eve leave was taken of the Macquarie Island party, who were destined to remain there for two whole years.

Steaming south from Macquarie Island, the first ice was met in lat. 64° S., and in lat. 65° 40′ S. the pack became impenetrable. The vessel was headed west, and repeated attempts made to work southwards through the pack. Eventually at 6 A.M. on January 3, when skirting a field of ice, travelling before a fresh breeze in thick weather, a continuous ice wall ranging from 40 to 100 feet in height was dimly discerned through the falling snow on the port side. Our position was then approximately lat. 65° 40′ S., long. 144° E. The weather cleared, and investigation showed it to extend for a great distance, as if it were

part of some land mass. On the return of the *Aurora*, the following summer, this formation was discovered to be a floating iceberg of stupendous proportions; its length being quite 40 miles. In the interval of a year it had shifted its position about 50 miles to the north-west. At the western end of this berg a narrow strip of pack was negotiated, and open water extended to the south. Then a strong blizzard arose which was weathered out under the lee of the berg.

Further progress to the south was made when the conditions permitted. During the afternoon of January 6 an ice cliff loomed up ahead, extending to the horizon in both directions. This proved to be an immense ice tongue—afterwards named the Mertz glacier—pushing 60 miles out to sea from a great ice-capped land (Fig. 5). This land, along which we steamed during the next two days, had never before been seen. Its continuity with Adelie Land was subsequently proved, and it was then decided to include our new discoveries under the same title. The land rose up everywhere from the sea to form a plateau. Only rarely did portions of the rocky platform break through the ice-sheet. Numerous rocky islets fringing the coastline were a notable feature, and these formed admirable breeding-grounds for marine birds.

Flocks of sea-birds in great variety flew around the *Aurora*, as if welcoming our entrance to their unbroken solitudes. Alas for those beautiful creatures, for we were destined to reap a harvest from amongst them. The eggs of most were either rare or unknown, and some of the birds were entirely new to science.

At a point some miles from the nearest portion of D'Urville's Adelie Land a suitable spot was discovered for a wintering station. This was a rocky outcrop, a little over a mile in extent, henceforth known as Cape Denison. In this location rocks projected from under the ice-sheet within a sweeping indentation of the coastline which we named Commonwealth Bay (Fig. 5).

In Commonwealth Bay the coast is dangerously bordered by rocky islets and reefs. With the object of selecting a passage and an anchorage for the ship, a preliminary examination of the in-shore waters was made by a party in the whaleboat. Late that evening a gale of wind commenced to blow off the land. The motor launch had, meanwhile, been despatched ashore, and by the time it arrived back at the ship a high sea was running. In order to save the launch the risky proceeding had to be adopted of steaming into the wind until close under the lofty ice cliffs, where calmer water was found. While this expedient was being carried out a few very anxious moments were passed, for the bottom was shallow, rocky, and uneven. Fortunately the calmer water was reached without accident, and the anchor dropped in six fathoms.

The launch again caused anxiety by breaking away just as preparations were being made for hoisting it up. Away it went before the wind with Bickerton, Hunter, and Whetter on board. The rudder had been unshipped, and in the sea which was running Whetter found it impossible to step it properly. After many futile attempts a temporary fastening was made. Worse still, though Hunter got full duty out of the hand-pump, the water breaking over the sides affected the motor and caused

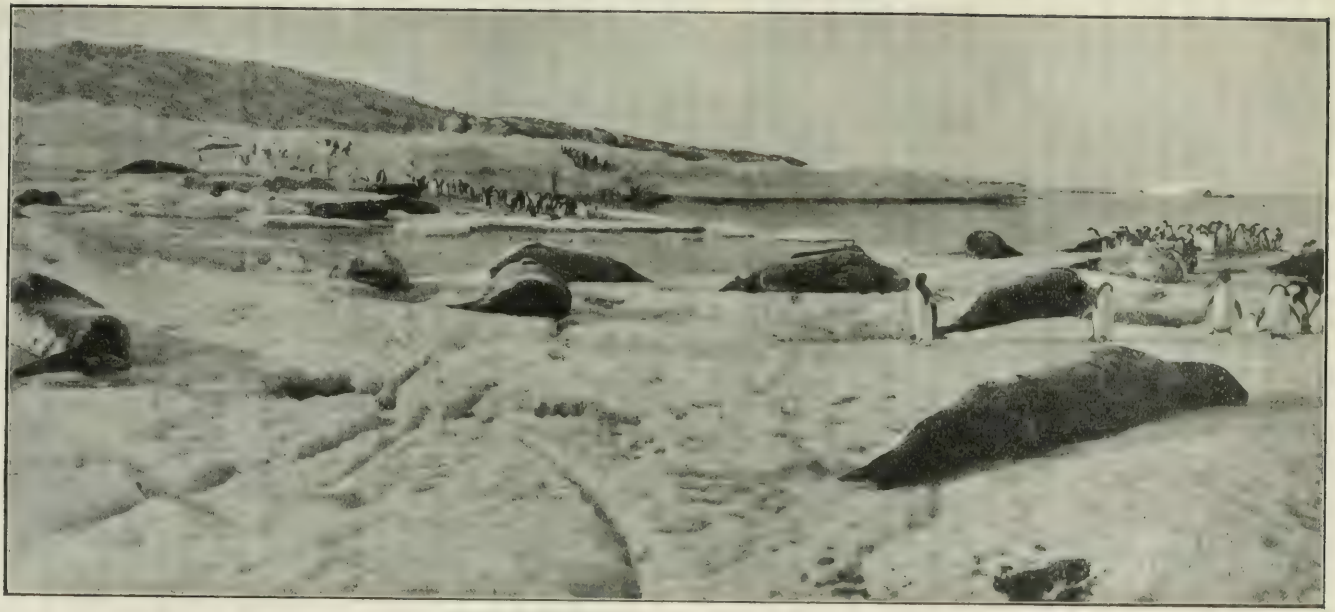

FIG. 2.—Life on the shore of Adelie Land.

trouble in starting. They had drifted half a mile and were approaching a rocky group of islets where they would have met with destruction, when we saw the launch start by her own power and were thankful it was no later.

Although summer was at its height, the weather proved little better than a succession of gales directed off the land, veering between south and south-east. This state of things greatly hindered landing operations. We were fortunate in finding an excellent boat harbour at Cape Denison, between which and the ship the motor launch continually plied whenever the weather was propitious. Tentative arrangements had been made for the landing of three separate parties at intervals along Antarctic shores, should opportunities arise. Upon discovering the wind-swept and desolate nature of the newly discovered land, I decided to attempt only two bases, amalgamating the smallest of the subsidiary bases with the main base. In the light of subsequent events it was well we did this, for the climate, and, consequently, the exploration of Adelie Land, proved to be the toughest task on any yet known Antarctic land—for the matter of that, of any land. Eventually, by January 19, the whole of the stores and gear of the main base were transferred to the shore. I gave instructions to Captain Davis regarding explorations to the westward and the landing of a party under Mr. F. Wild. From our tent doors we watched the good ship steaming over the western horizon, advancing into the great unknown.

The *Aurora* steamed west for a day along the coast seen by D'Urville and Wilkes in 1840, until the limit of open water was reached. This stretch of navigable sea we named the D'Urville Sea. Later we discovered that the absence of pack ice is due to the persistent gales setting off the land in that locality. The coast of Adelie Land could be traced in a westerly direction, but, on account of heavy pack, the vessel could not follow along the coast, the only course being to skirt the heavy ice to the north and west. At this point Davis expected to sight the high land reported by the United States Squadron (1840) as lying to the west and south-west, but no land was seen.

In long. 132° 30′ E., they were able to stand south again and shortly afterwards passed over the charted position of D'Urville's Côte Clarie. I quote from Captain Davis's report: "The water here was clear of pack ice, but studded with bergs of immense size. The great barrier which had been followed for 60 miles by the French ships in 1840 had vanished—nothing remained to mark its former position except a collection of huge bergs. At 10 A.M., having passed to the south of the charted position of Côte Clarie, we altered course to S. 10° E. true. Good observations placed us at noon in 65° 2′ S. and 132° 26′ E. with a sounding of 160 fathoms on sand and small stones. We sailed over the charted position of land east of Wilkes' Cape Carr, the weather was clear and there was no trace of land to be seen in this locality."

A few hours afterwards, still steaming south, new land was sighted—icy slopes rising from the sea, similar to those of Adelie Land, but of greater elevation. Shallow soundings were obtained. Fast floe ice

extended far out to sea from the land, and the nearest approach the ship made was 12 miles distant.

To this discovery we gave the name of Wilkes Land, to commemorate the name of a navigator whose daring was never in question, though his judgment as to the actuality of *terra firma* was unreliable.

Captain Davis steamed west, keeping the land in sight, until the evening of January 24, when the ice headed him off to the north. During the next four days violent gales and heavy seas prevailed. The view was obscured by driving snow so that nothing was visible.

It was not until noon on January 31 that the atmosphere was sufficiently clear to see any distance. The ship was then pushing south amongst heavy pack ice in the vicinity of 120° E. long. A portion of Balleny's Sabrina Land was sailed over, and there was no indication of land in the vicinity. Finally a point was reached 7 miles from a portion of Wilkes's Totten's Land, reported to be high land. A sounding gave 340 fathoms. The weather was clear and high land would have been visible at a great distance. It was therefore apparent that Totten's Land either does not exist at all, or is situated some distance from its charted location. The pack was too heavy for the ship to penetrate further to the south, so a course was set to the west. Heavy pack barred the way to the south.

Some days after, the vicinity of Knox Land, of Wilkes's charts, was reached. With the exception of Adelie Land, which the French sighted some days previous to the Americans, the account by Wilkes concerning Knox Land is more convincing than any other of his statements relating to new land. If not already disembarked, we had counted on settling our western base in this place. It was, therefore, very disappointing when heavy pack ice barred the way, at a point still north of Wilkes's furthest south in that locality. Three attempts to force a passage were made. They were, however, without avail; in the third case the vessel was extricated only with great difficulty. No land had been sighted, but soundings indicated that land would in all probability be met with to the south. Repulsed from his attack upon the pack ice in that vicinity, Captain Davis decided to go still further west. The course made carried them to the north-west.

Early on the morning of February 8, in foggy weather, a wall of ice about 80 feet high appeared across the bows extending in a north-westerly direction. Following this along, the weather cleared and it was recognised to be the face of an extensive flat-topped mass of floating ice. Rounding a cape to the west, and passing through loose ice, open water was reached to the south. Fifty miles in that direction the sea was found to shallow rapidly, and a maze of large grounded bergs was entered. The bottom was found to be very regular, ranging between 110 and 120 fathoms.

After several days' delay owing to a blizzard, they were able to push south again on February 11. The last of the obstructing ice was negotiated on February 13, and the ship steamed into a broad sheet of water still stretching to the south. This open sea inside the pack-ice belt we ascertained, later, to be a permanent feature of that vicinity, and to it I

gave the name of the Davis Sea, after the intrepid captain of the *Aurora*.

One hundred miles further to the south, in lat. 66° S. and long. 94° 23′ E., the icy slopes of new land were seen extending east and west as far as the eye could reach. The sphere of operations of the German Expedition of 1901 was now near at hand, for their vessel, the *Gauss*, had wintered frozen in the pack about 125 miles to the west. The land to the south, which the Germans visited by sledge journey over the pack ice, was eventually proved by one of our own sledging parties to be continuous with the new land now sighted by the *Aurora*. The "high land" in the direction of Wilkes's Termination Land, seen by the Germans during a balloon ascent, we found to be a high ice-sheathed island about 9 miles in diameter. To this we gave the name of Drygalski Island. The position marked for Termination Land on Wilkes's charts we found to be occupied by pack ice and a barrier-ice formation (marginal shelf ice).

The formation in question, trending about 180 miles to the north from the newly discovered land just referred to, was found to be very similar in character to the well-known Ross Barrier over which lay part of Scott's and Amundsen's journeys to the South Pole. This we named the Shackleton ice shelf. Its height is remarkably uniform, ranging between 60 and 100 or more feet. Making allowance for the average specific gravity, this indicates an average total thickness of perhaps 600 feet. In area it occupies many thousands of square miles.

This wonderful block of ice originates fundamentally from the glacier-flow over the great plateau-land to the south. Furthermore, every year an additional layer of consolidated snow is added to its surface by the frequent blizzards. These annual additions are clearly marked on the dazzling white face of the ice cliff. There is a limitation placed upon this increasing thickness, for the whole mass is ever moving slowly to the north, driven by the irresistible pressure of the land ice behind. *Pari passu* with this advance its northern face is crumbling away before the action of the sea, breaking down into bergs and brash ice.

During the third voyage of the *Aurora*, we had the unique experience of witnessing this crumbling actively at work. As we were steaming along within 300 yards of the cliff face, suddenly a mass weighing perhaps a million tons broke away, first sinking down into the sea. Then followed an interval of a few minutes, during which it majestically rose and sank alternately accompanied by a rapid splitting up. At the end of five minutes only small bergs and brash ice remained.

To return to the *Aurora* within sight of new land. As they steamed in towards the rising slopes an extensive floating ice tongue with cliffs 100 feet high was kept on the "port" side. Captain Davis writes on February 13: "We followed the western side of the tongue in a southerly direction until 5 P.M., when we were stopped by fast ice extending right up to the land. We sounded in 250 fathoms on mud; the land appeared to be from 25 to 30 miles from our position. Wild landed and made a short journey towards the land. On his return he reported that the land was fully 25 miles from the point he had reached and that the ice was evidently breaking up."

It had now become imperative to land the western party. After a consultation, Captain Davis and Mr. Wild decided that under the circumstances the landing of the wintering party should be attempted on one of the floating shelf-ice formations, as nothing better presented itself. The ice tongue near at hand suggested itself as suitable. Fortunately before landing the impedimenta a reconnaissance was made, with the result that it was discovered to be nothing more than a huge iceberg about 24 miles in length. Eventually a location was chosen on the Shackleton ice shelf. The spot selected was about 17 miles from the land itself—the nearest approach possible by the ship. Just there the low floe ice—the frozen sea surface—met the great ice wall of the shelf-ice sheet. Then followed several days of hard work, getting the hut, stores, coal and instruments to the top of the cliff. This was accomplished with the aid of a "flying fox." Twelve tons of coal was the last item sent up. On February 20 Captain Davis writes: "We did not get the coal ashore a moment too soon, as this morning our sledge track went to sea—in a NW. direction—and this afternoon it is drifting back under the influence of a tide or current. I went up on the glacier with Wild this afternoon. It is somewhat crevassed for about 100 yards inland, and then a flat surface stretches away as far as the eye can see. We sail early to-morrow."

No time was lost in sailing, for the long campaign in the ice had left the ship desperately short of coal and ballast. It was then February 21, and negotiation of the pack-strewn sea was rendered more difficult and dangerous on account of the growing hours of darkness. In the regions traversed the climatic conditions proved worse than had been expected. Foggy weather or falling snow was the rule, gales were prevalent, and, worst of all, even within a few weeks of the height of summer, darkness enshrouded the midnight hours and rendered navigation amongst the ice precarious. However, the 2300 miles to Hobart were accomplished without accident, the vessel arriving on March 12 with only 9 tons of coal as ballast.

The vessel was refitted in Sydney and deep-sea dredging gear erected, capable of securing samples of the bottom-life in the deep ocean. On May 20, 1912, a voyage south was commenced to investigate the ocean floor between Australia and Antarctica. A call was made at Macquarie Island, and several weeks were spent at the Auckland Islands. There Mr. Waite, biologist, succeeded, amongst other things, in capturing six of the very rare flightless ducks indigenous to the Auckland Islands. On July 11 the *Aurora* reached Lyttleton, New Zealand.

After outfitting in Melbourne, a second cruise was made between the dates of November 15 and December 15, 1912. On that occasion Professor Flynn accompanied the vessel as biologist. A large part of the work of both these voyages was the delineation of the floor of the ocean. Up till then, excepting those in the coastal waters of Australia, Tasmania, and New Zealand, very few depths indeed had been determined in that great stretch of ocean southward to the Antarctic Continent within our sphere of operations. The contour of that ocean floor has a bearing on the theory of a lost southern continent. Thus the soundings obtained were of unusual interest.

The two most important results of the winter cruises of 1912 were, firstly, the discovery of a submerged island-like plateau southward of and about the size of Tasmania; secondly, a trough-depression was found to separate Macquarie Island from the Auckland Islands and others which stand upon the same submarine platform as New Zealand. In a report, Captain Davis, referring to the oceanographical work carried out successfully during my absence in the Antarctic, writes: "Our success was due to the persistent efforts of all, a determination on the part of officers and men to carry out successfully that portion of the work of the expedition assigned to the ship." The ship's company do, indeed, deserve very

FIG. 3.—The Hut at Cape Denison, Adelie Land. Only the roof projects above ice-level.

great credit for the able way in which they carried out their share of the work.

To return to the main base party in Adelie Land. The hut was quickly erected, and self-recording instruments housed and set running without delay. Preparations were made for autumn sledging, and a journey commenced on March 1, 1912. The weather had been bad enough before, but on March 2 it became worse and my party returned, leaving the loaded sledge on the plateau. After that date there was no slackening of the wind, excepting for an odd hour or two, until far on in the spring. It was not until late in August that the sledge was recovered. During that interval we led a strenuous existence at winter quarters, buffeting with a sea of drifting snow which poured fluid-thick over the landscape. The average wind velocity in Adelie Land proved to be far beyond any-

thing previously known. The charts of the self-recording instruments show the average for the whole year to be 50 miles per hour. Average hourly velocities of 100 miles and more were common, and twenty-four hourly averages of over 90 miles were recorded. Frequently the air travelled forward in a series of cyclonic gusts, near the foci of which momentary velocities were reached very much higher than the averages mentioned. Thus pebbles were lifted, and structures not buried in the *névé* thrown down. Fortunately, the hut was soon drifted over to such an extent that only a portion of the roof remained above ground (Fig. 3). Entrance to the interior was effected in fine weather by a trap-door in the roof, at other times through tunnels in the *névé*.

For months the drifting snow never ceased, and intervals of many days together passed when it was impossible to see one's hand held at arm's length. The drift-snow became charged with electricity, and in the darkness of the winter night all pointed objects and often one's clothes, nose, and finger-tips glowed with the pale blue light of St. Elmo's fire. Add to this the force exerted upon the body, the indescribable roar of the hurricane, the sting of the fury-driven ice particles, and the piercing cold, and some idea is got of the conditions under which the routine of out-door observations was maintained. Such weather lasted almost nine months of the year. Even in the height of summer blizzard followed blizzard in rapid succession.

When it became apparent that winter quarters were situated in the vicinity of the centre of a permanent anticyclone we modified the sledging gear to meet the unexampled circumstances and determined to face the elements as we found them. Tents similar to those used with such success by British expeditions in the Ross Sea area were found quite impossible. Even when greatly strengthened their life proved very short. Three reconnaissance parties thus provided, setting out in September 1912, had their tents torn to ribbons and were fortunate in reaching the hut without serious accident. One of these parties led by Madigan, assisted by Whetter and Close, returned badly frost-bitten after a splendid effort. To save the tents two underground rooms were excavated in the glacier ice on the highway to the plateau at distances of $5\frac{1}{2}$ miles and $11\frac{3}{4}$ miles respectively from the hut. There quantities of stores were accumulated during the spring ready for an extensive summer sledging campaign.

The constant hurricane along the Adelie Land coast broke up the sea ice as quickly as it formed and pushed it away to the north. To our great disappointment, therefore, we had to abandon any idea of sledging over the frozen sea. It was not until November 7 that there was sufficient moderation in the weather for a final start. Five diverging parties worked simultaneously, so that a maximum of new ground was covered during the comparatively short sledging season.

Stillwell, assisted by Close and Laseron, mapped in the coastline to the east as far as the Mertz glacier. Stillwell's map illustrates the immense number of rocky islets that fringe the mainland in that vicinity. There silver petrels, Antarctic petrels, Wilson petrels, snow petrels, cape pigeons, etc., were found nesting in large colonies.

Further east Madigan, assisted by M'Lean and Correll, continued the work, reaching 67° 14′ S. lat. and 150° 21′ E. long. Eastward of the Mertz glacier they found the sea frozen and travelled over it for the remainder of the journey, crossing the 15-miles-wide tongue of the Ninnis glacier and visiting several headlands by the way. In the vicinity

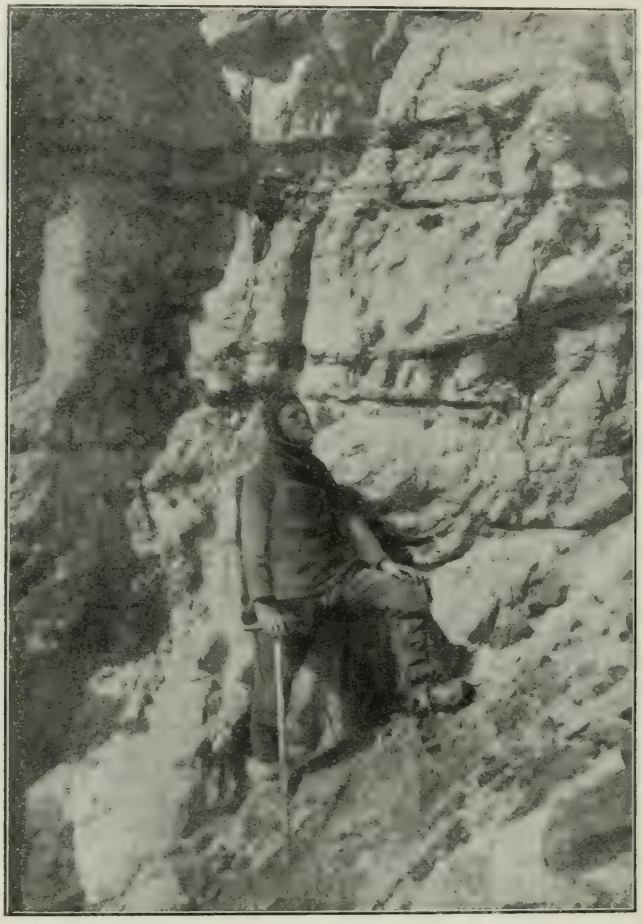

Fig. 4.—The sandstone cliffs below the dolerite at the Horn Bluff, King George Land. In this sedimentary series coal is found. The figure is that of Madigan, leader of the party which found the coal.

of the Horn Bluff there is a sweep of coastline bounded by rocky cliffs, 1000 feet high. There they discovered coal and carbonaceous shales outcropping at an elevation of several hundred feet, associated with red sandstone and capped by an immense thickness of columnar dolerite. Madigan made frequent determinations of magnetic dip and azimuth. Nearer to winter quarters only gneiss and schists are exposed. The

new land east of the Mertz glacier we have received his Majesty's gracious permission to name King George V. Land.

It was across King George V. Land that Ninnis, Mertz, and I made the sledging journey that ended so unfortunately. It was our intention to cross rapidly the coastal highlands to the south of the tracks of Madigan's party, and to pick up the coast beyond where they could expect to reach. To give the necessary increased mobility we commandeered all the dogs. The various other parties proceeded only by the sure but slow method of man-hauling. The outward journey proved unusually arduous, for it turned out that several coastal lobes had to be crossed, entailing repeated ascents to about 3000 feet and as many descents to near sea-level. Also, the intervening depressions occupied by more rapidly moving ice (glaciers) were found to be heavily crevassed, and many serious accidents were narrowly averted. It was when all these dangers were believed to have been left behind that the catastrophe occurred.

On December 14, when we had travelled outwards 311 miles, and were crossing the coastal highlands in 68° 54′ S. lat., 151° 33′ long., Ninnis, with his dog team and sledge, broke through the roof of a *névé*-covered crevasse and fell into an unfathomable depth below. All that could be seen was a dead dog, an injured dog, and a few fragments of the sledge load caught on a shelf 150 feet below. The moans of the injured dog ceased, and no sound was heard in answer to our frantic calls. Our loved comrade had without doubt been killed instantly. All the dog food and almost all the man food, besides the tent, pick, shovel, and many other necessaries had gone also. Mertz suffered the loss of his Burberry trousers: as a substitute he used henceforth an extra pair of woollen under trousers that happened to be saved. The six dogs remaining were the poorest of the pack, for the best preserved animals had been drafted into the rear team, as it was thought that the risk lay in front. Fortunately, there was saved a spare tent cover, and a frame was improvised, using a pair of ski and the theodolite legs. Later on a broken spade was picked up at an old camp.

Deliberating on what was to be done, it was concluded that a descent to the frozen sea would be dangerous on account of heavy crevassing in that direction and would undoubtedly cause delay. Further, the nature of the surface of the sea ice along that coast was entirely unknown, and it was extremely likely that it would be breaking up. On the other hand, on sea ice there was a chance of obtaining seals for food. It seemed to us, however, that as we now knew the nature of the country between us and winter quarters, a return journey over the plateau, avoiding most of the difficult areas met with on the outward journey, could be made in quick time, and by eating some of the dogs the food supply would last out. After full consideration, the latter plan was adopted. Nine hours later I read the burial service; our fallen comrade we had come to know as a man of fine spirit and high courage. His death was a sad blow to us.

We set our faces towards the hut. Owing to delays by bad weather, the ration had to be reduced further than had been anticipated. The

dogs gave out daily, so that soon there were none left. The little flesh which they provided contained a minimum of nutriment and was difficult to digest. Nevertheless, early in the first week in January a point was arrived at 100 miles from the hut. For several days past Mertz had shown a derangement of the alimentary system resulting from the short and unsuitable ration. I was affected likewise to a less extent. We were very weak from want of food, and the weather was abominable—day after day nothing but dense falling and drifting snow. Starving as we were, the cold was felt intensely. The daily stages grew shorter.

On January 3 it became evident that my comrade's condition was worse than my own. The best food remaining had not the expected effect, and he turned quite against the dog's flesh. Even under those circumstances he remained cheerful and undaunted. I could not have wished for a better companion. The weather was a little clearer on January 6, but the slippery surface occasioned frequent falls, painfully jarring our emaciated frames. It was soon evident that Mertz could not proceed on foot. After some demur he agreed to try riding, but even with the help of the sail progress was slow. Much toil resulted in $2\frac{1}{2}$ miles only recorded on the meter; certainly a less distance towards the goal, for it was possible in the drift to steer only a very rough course. On the morning of January 7 Mertz's condition was much worse, and about midnight January 7-8 he passed away after having been in a delirious and unconscious state for some hours. Thus died a man of sterling qualities whom we had all learnt to love as a brother.

My own condition was such as to hold out little hope, but I determined to push on to the last, anticipating that at least a record might be left near Aurora peak, a place likely to be visited by search parties.

On January 11, after spending three days, during which particularly bad weather prevailed, in arranging everything to facilitate forward progress, I resumed the march alone. The sledge had been cut down to half its length, and all the dogs' meat remaining had been cooked to save dragging the extra kerosene. It snowed and drifted almost every day. Fuller details of this journey have appeared in our book relating the story of the expedition: suffice it now to state that after three weeks' creeping forward wherein most providential escapes from crevasses were experienced, I had the good fortune to stumble upon a cache of provisions. This cache, situated 20 miles from the hut, was one of several that had been left by a search party. The discovery of the food was a fortunate circumstance indeed, for had it been a little more to one side of the course it would have been invisible on account of the drifting snow.

Stimulated by good food, the march was resumed. The polished ice of the coastal downfalls was met, and with the wind blowing as it did, I found it impossible, in finnesko, to stand up. The crampons had been thrown away to lighten the load. Eventually a pair of makeshift crampons was made from the theodolite case and nails and screws out of the sledge fittings. Thus the cave $5\frac{1}{2}$ miles from the hut was reached. Then a strong blizzard reaching a velocity of 80 miles per hour caused further delay. The wind fell off on February 8. Descending the ice slopes to the hut, I saw the *Aurora* on the horizon, outward bound.

A party of six, Madigan (in charge), Bage, M'Lean, Bickerton, Hodgeman, and Jeffryes, were at the base, left to carry out the scientific observations for another year and make a search for myself and comrades. During my absence the party at the hut, assisted by members of the ship's crew, had re-erected the aerial of the wireless installation, the mast having been blown down the previous year. The ship was fitted with a receiving set, but was without the necessary apparatus for sending messages. On the evening of February 8 I despatched a message recalling the ship. It was a beautifully calm afternoon and evening, and we expected to be away early in the morning. As the ship came into sight again, however, the wind rose, and, of course, there was no knowing how long it would continue, for, in Adelie Land, the calm periods are few and far between except at the height of summer. I had learnt from those remaining that great anxiety had been expressed by Captain Davis as to the safety of the western party in charge of Wild, should they not be relieved that year. In the absence of exact information as to the circumstances under which that party were living, the possible difficulties in effecting relief depending on the weather conditions in their locality, the special features of the pack ice thereabouts from the point of view of navigation, and, finally, from lack of information as to the condition of the ship, her coal supply, health of crew, etc., I could do no other than leave to Captain Davis, who was acquainted with those details, the decision as to whether he should delay any longer at the main base. Accordingly I sent a wireless message to the ship to the effect that I hoped the position would allow of the *Aurora* remaining a day or two longer in the hope of the weather calming, leaving the actual decision to Captain Davis himself. This message does not appear to have been picked up, and Captain Davis, in view of the gravity of the situation, did well in acting on his own responsibility. As evening came on the barometer fell and we saw no more of the vessel.

Of other summer sledging parties from the main base one was led by Bage to the south, inland over the plateau, and another led by Bickerton over the highlands to the west. Bage's companions were Webb and Hurley. Murphy (in charge), Hunter and Laseron formed a supporting party accompanying them for 67 miles. After leaving the coast no sign of rock was seen, their track lying over a desolate wind-swept plateau. The wind seldom ceased, and drifting snow was the rule. This constant flow of air has cut in the plateau surface of Adelie Land deep sastrugi, of such dimensions as are not met with elsewhere. Hurley obtained excellent photographic records of them. Over those obstacles they dragged their sledges in the face of the wind for 300 miles out from the hut, to a point within a few miles of the magnetic Pole. There an elevation of 6500 feet was reached. On one occasion a march of 40 miles was made. The magnetic data from that journey are particularly valuable, for Webb took full sets of observations for dip and azimuth at regular intervals. The difficulties with which he had to contend in carrying out such delicate observations in the biting wind can scarcely be realised by those who have not experienced the like conditions. On the return journey, after waiting several days in the vicinity of a food

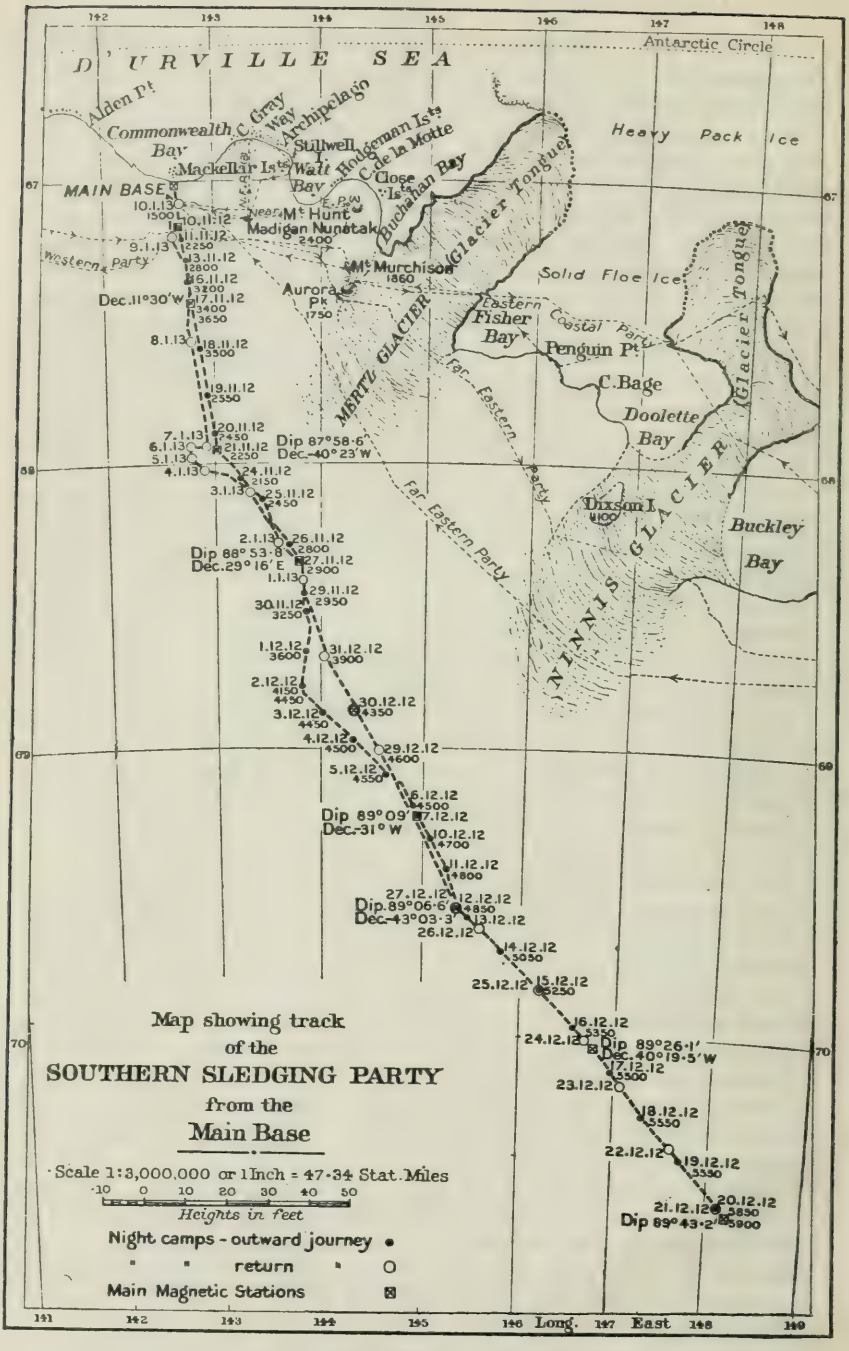

FIG. 5.—The main Base and its vicinity.

depôt 67½ miles from the hut, it had to be abandoned, for drifting snow obscured everything. With but two days' supply of food left they pushed on to reach the coast, trudging onwards hour after hour in clouds of drifting snow. Fortunately before it was too late Aladdin's Cave, 5½ miles from the hut, was reached.

Hodgeman and Whetter with Bickerton formed the western party. The air-tractor sledge was told off to assist them. Unfortunately, after reaching a point about 2000 feet up, some 10 miles south of the hut, several of its pistons broke and it had to be abandoned. A few days previously a successful trip on to the plateau and back had been made, leaving no doubt but that under different conditions, and with slight modifications, an air-tractor would prove quite valuable. The western journey was conducted for the most part at an elevation of about 4000 feet, and proved very dreary. Wind and drift were the rule, notwithstanding the fact that it was then the height of summer. The average wind velocity for the period of the whole journey, as calculated from the daily records, was 34 miles per hour. They passed over the highlands of the Adelie Land seen by D'Urville, coming close to the coast in lat. 66° 33′ S., long. 138° E., where they saw frozen sea to the west. One of the points of special interest connected with this journey was the finding of a piece of rock[1] a pound or two in weight lying on the surface of the island ice-sheet far from any nunataks.

Captain Davis sailed from Hobart to the relief of the Antarctic wintering stations on December 26, 1912. Heavy weather was met going south, but nevertheless a number of soundings were secured. Commonwealth Bay was reached on January 12. At that date some of the parties had not arrived, but all with the exception of my own appeared during the following few days. When the date prescribed for return had been exceeded by a week, Davis made preliminary arrangements to leave a search party to remain for another year. M'Lean, Hodgeman, and Hurley sledged on to the plateau on the look-out for us. Before returning they laid several depôts on the highlands southward of winter quarters on the chance that we might find one or other of them.

The ship's party made a search of the coastline to the east, but arrived back at Commonwealth Bay on January 31. The wind was blowing too strong to communicate with the shore party. Instead of moderating, it freshened. A heavy gale continued until the morning of February 8, when a lull set in at 10 A.M. During that time the vessel had been steaming into the heavy seas, keeping the coast in sight. Captain Davis logs: "All hands were exhausted and the vessel covered with ice, and our likelihood of being able to reach the second base this year looks doubtful." Accordingly no time was lost in taking on board all except the six who were to remain, and off they went on a 1500-mile voyage to relieve the western base. That evening, when 50 miles out to sea, Hannam at the wireless receiver heard of my return to the hut. As already recorded, the wind again sprang up and prevented our relief, and they departed

[1] This rock is quite unusual in appearance and may prove on examination to be a stony meteorite.

at 6.30 P.M. on February 9. They pushed through the pack at the north of the D'Urville Sea the next day, and then shaped a course to the west. In this part of their voyage a three days' easterly gale, thick with flying snow, was experienced. During those days, under sail and steam, she pushed rapidly to the west. Very fortunately no bergs fell foul of their path. It was nevertheless a most anxious time. Davis wrote: "As daylight came each morning we could feel thankful that another night (which then lasted five hours) had passed without disaster."

North of the Shackleton shelf ice-sheet the ice conditions were found to be different to those of the previous year. Great difficulties were

FIG. 6.—In a gale off Adelie Land, Jan. 1913. A big sea running, and the vessel crusted with ice.

encountered in pushing a way through. Eventually the western base was reached at 12.30 P.M. on February 23. After picking up the party and their collections final departure was effected at 9 P.M. of the same day. Steaming north, 400 miles of sea strewn with great numbers of bergs and fragments of floe ice were traversed and Hobart reached on March 15.

The ice-sheet upon which the hut of the western base was erected was uneven and much crevassed for 200 to 300 yards from the edge; beyond it became more even and less crevassed. During the construction of the living hut, Harrison one day standing upon the roof framework sighted a large island rising out of the ice-sheet to the east. An igloo was built as a magnetic observatory. Upon the completion of the hut and the commencement of a regular meteorological and

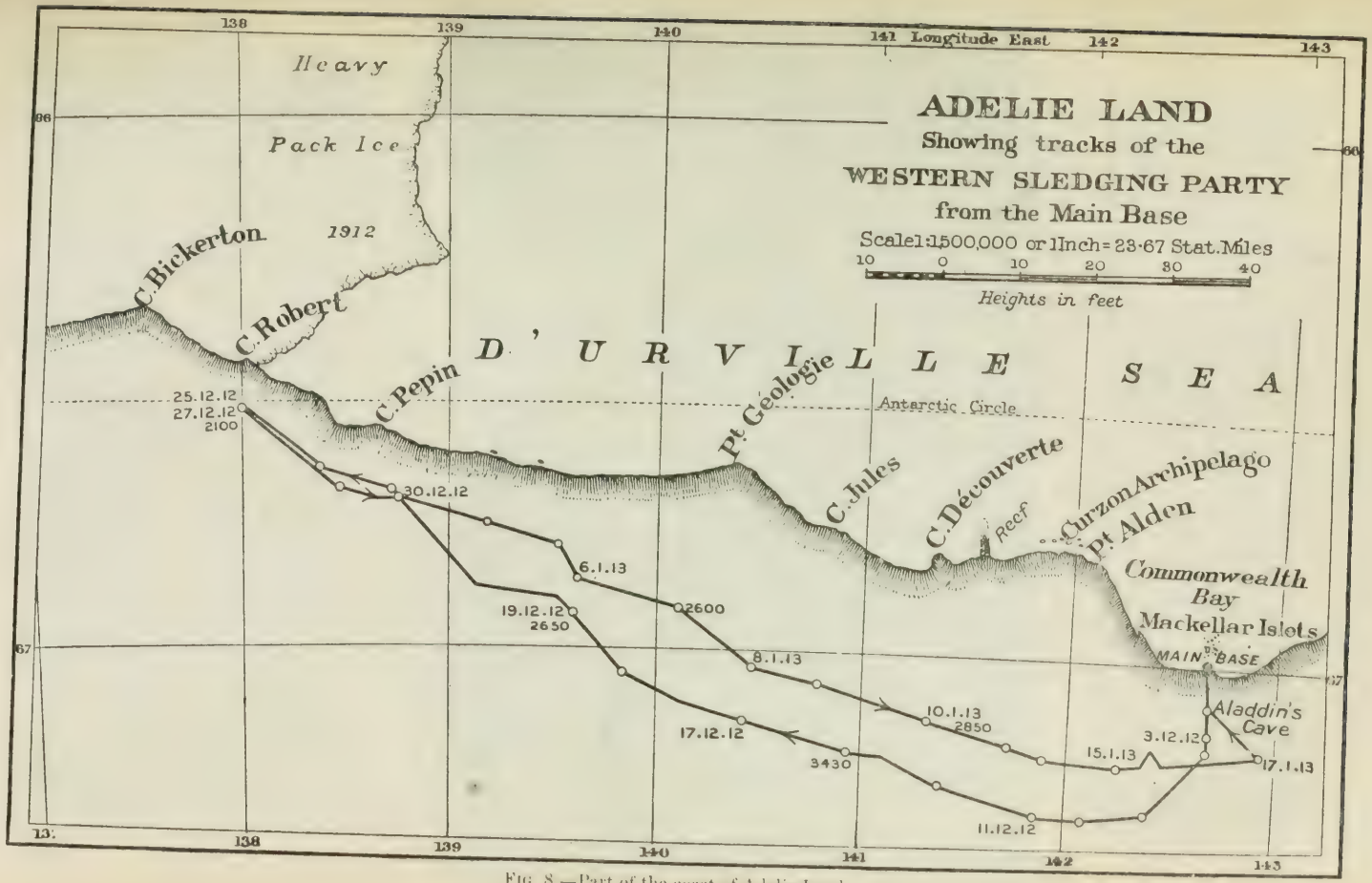

FIG. 8.—Part of the coast of Adelie Land.

magnetic programme an autumn sledging journey was commenced. Wild with Dovers, Harrison, Hoadley, Jones, and Moyes set out on March 13, 1912, with the idea of reconnoitring the coastal slopes of the mainland, and there catching a supply of food for use in more extended operations later in the year. A point 2000 feet above sea-level and 35 miles in a direct line from the hut was reached. There protracted blizzards accompanied by an unusually heavy snowfall, rendering the surface difficult to travel over, necessitated a return to the hut after catching a large supply of food.

The snow buried their hut, and a fine series of store-houses was made by driving tunnels and chambers out in all directions into the snow. The floe ice had all broken up at the end of summer, and thenceforth until next summer no seals or penguins were to be got. Several short sledging journeys foraging for fresh meat supplies were conducted in April. The winter was marked by frequent blizzards and heavy snowfall.

On August 20 Wild, Harrison, Jones, Moyes, Dovers, and Watson, assisted by three dogs (all that remained), set out on a depôt-laying journey to the east. The food was cached at a point on the Shackleton ice-sheet 84 miles out. Temperatures as low as $-47°$ Fahr. were experienced. Small nunataks and large islands were seen rising from the ice-sheet, and several rocky cliffs appeared along the coastline of the mainland. On one occasion on the return journey they camped under one of these cliffs—a sheer face of rock 400 feet high, crowned by a 200-feet cliff of ice. It was found that the inland ice-sheet pressing forward kept continually overthrusting great avalanches of ice, from one of which they had a narrow escape.

Towards the end of September Jones, Dovers, and Hoadley set out on a month's depôt-laying journey over the sea ice to the west. About the same time Wild, Kennedy, and Watson reascended the highlands southward of their winter quarters. At the end of October and early November commenced the summer sledging journeys, one to the east, the other to the west.

For the eastern sledge journey Wild picked Watson and Kennedy for his companions, and Harrison was to accompany them to the depôt, 84 miles out, then to return by himself. The start was made on October 30. On arrival at the depôt, though the food was found, the sledge that had been left to mark the spot, standing vertically and stayed with ropes, was not recovered. The wind had carried it away. Not finding the sledge, Wild decided to take Harrison on with them, as they could not afford to give him a sledge for his return journey. At 120 miles east of their hut they met a large glacier—the Denman glacier—descending into an embayment of the coast and then pushing out through the Shackleton ice-shelf. Referring to this Watson says: "Viewed from the Shackleton ice-shelf, right to the southern horizon is seen a stream of broken upturned ice, descending by cascade after cascade, and finally by still mightier cascades, to the level of the bay. It falls 3000 feet in 15 miles. Continuing on it meets and absorbs a number of tributary flows, fills the whole bay with its maze of icy confusion, and spreading fan-fashion sweeps on to the north to the horizon in wide and ever-widening billows

of upturned impassable ice. It ploughs its way through the more sluggishly moving ice-shelf. At the point of conflict at the sides there are mighty pressure ridges ranging up to 400 feet in height; ice that had, as was evidenced by diatomaceous stains on it, previously been under sea-water. Sea-water was present in many of the cracks and crevasses. Although the seaward face of the shelf was over 100 miles away, the shelf had been rent to the bottom."

An attempt was made to cross this chaos of ice, but it had to be relinquished. A second attempt was made some distance to the north with no better fortune. A large island 900 feet high, upon which were many

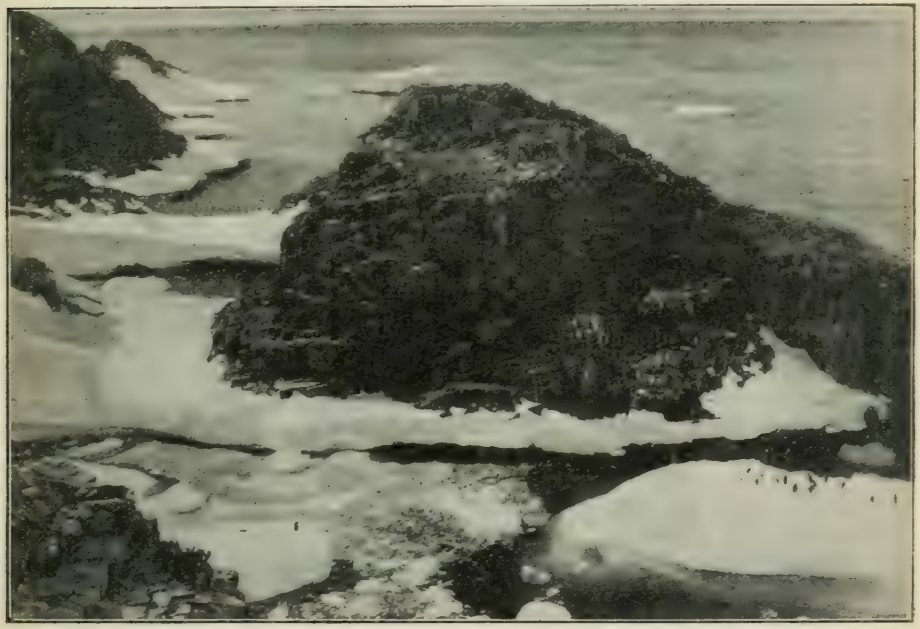

FIG. 9.—The coast of Adelie Land near Cape Hunter in Commonwealth Bay. The rocks are an ancient series of phyllites.

rock exposures, was examined and mapped. Ascending the highlands of the mainland on the western side of the glacier, they reached the rocky peak projecting from the ice-cap at an elevation of 3280 feet above sea-level. The peak rose another 750 feet above the ice. From its summit other nunataks were seen at higher elevations to the south-east; also a long stretch of coastline with frequent rock exposures was visible to the east.

They arrived at the hut on January 6. Moyes, who had lived alone at the winter quarters for two months keeping up the routine observations, was overjoyed to find Harrison alive, for he had long since given him up as dead. On Harrison's non-appearance, Moyes had packed a sledge and gone out by himself on a six days' journey in search of his comrade.

Jones, Hoadley, and Dovers set out on November 7 over the ice slopes to the west. Progress was slow on account of the numerous crevasses. Most of the travelling was done at elevations of between 1000 feet and 4000 feet above sea-level. At a small rock island 420 feet in height, lying several miles off the coast of the mainland, they located an immense Emperor penguin rookery. It contained about 7000 young birds, which, on account of the heavy mortality amongst the young, argues something like 20,000 adults. They also discovered the eggs of some of the rare petrels.

After a journey of 215 miles by track (not counting relays) they reached Gaussberg, connecting with the work of the *Gauss* expedition. They reached the hut again on January 21. The rocks met with *in situ* on both these sledging journeys were crystalline schists and gneisses. The map incorporating the results of the sledging journeys from the western base shows what really good work was accomplished by Wild and his six companions, notwithstanding the fact that they had to winter under adverse conditions.

The seven of us remaining in Adelie Land for a second year had a very miserable prospect ahead. However, there was plenty of work in the routine scientific observations to keep the mind from dwelling unduly upon the raging elements without. Bage carried on the magnetic work in place of Webb. The care of about twenty sledge dogs presented to the expedition by Amundsen, and brought down by the *Aurora* that summer, fell to Madigan.

Fortunately wireless communication was established with Macquarie Island about the middle of February, and we were able to apprise the world of the happenings before even the *Aurora* herself had reached Hobart. The wireless proved a success and a boon throughout the year, though temporary stoppages occurred, owing to unusual difficulties arising chiefly from the constant hurricane. For example, it was found difficult to keep the aerial up; difficult to hear the messages on account of the muffled roar of the wind; and often impossible to work on account of the heavy electrical discharge from the atmosphere.

Later on Jeffryes, who was not so strong in health as the others, had to be relieved, Bickerton taking his place as wireless operator, which post he continued to hold with conspicuous ability until the arrival of the relief ship. Each summer, for a period of about three months, the wireless communication was broken down on account of continuous daylight. In the matter of weather the second year proved even worse than the first, and we were very glad indeed when the summer arrived.

In November Madigan, Hodgeman, and myself set out with the dogs on a short sledging journey to the Madigan nunatak and Mount Murchison. We hoped to recover certain instruments cached the previous year. In this we were disappointed, for it was discovered that the winter snows buried deeply the surface of the previous year. Returning to winter quarters, as we descended the plateau slopes the *Aurora* was seen on the horizon steaming in towards Commonwealth Bay to our relief.

Wireless communication between Macquarie Island and Australia was realised in February 1912, and continued with scarcely a break until the

party was relieved in December 1913. Throughout that time Ainsworth every evening forwarded a synopsis of the weather to the Commonwealth Meteorological Office in Melbourne and to Wellington. The wireless station proved a great success, a wide range being maintained. Fremantle, Port Moresby, and Suva were some of the stations spoken.

Blake made a thorough map of the island by triangulation. This map shows approximate 500-feet contours for the whole island, and in the case of the northern portion the contours are 50 feet apart. Blake has produced evidence that in not long past times the whole island has been overridden by an ice-sheet travelling from west to east. It is found to abound in glacial lakes and tarns. The older rocks met with *in situ* are all igneous; the more recent ones glacial till and later sediments.

Hamilton had in the bird and seal life a wonderfully interesting field. Hamilton and Blake constantly visited parts of the island remote from the hut, making use of several dilapidated shelters distributed along the east coast left by sealers of past times. When I found that a party of us were to remain at Adelie Land for a second year I wirelessed the Macquarie Island party to the effect that it was desirable that they should remain on another year in order to keep in touch with us.

On account of shortage of funds the *Aurora* was laid up during the winter of 1913, and we were depending upon a small sealer to take stores to our party at Macquarie Island. July proved an unusually stormy month, however, and the vessel after being long overdue eventually arrived in New Zealand in a damaged condition, without ever reaching the island. By that time our men were living almost exclusively on sea-elephant meat. Fortunately the New Zealand Government promptly sent a steamer, the *Tutanekai*, to their aid. Sawyer, who required medical attention, returned at that time to New Zealand.

On December 2 the *Aurora* arrived, picking up Ainsworth, Blake, Sandell, and Hamilton *en route*, to relieve us in Adelie Land. With them they brought down three new men to carry on the meteorological and wireless station on account of the Commonwealth Government, by whom the station is to be maintained in the future. The result of the labours of Ainsworth and his party is that comprehensive scientific information regarding Macquarie Island is now available. Besides the routine work, many new problems have arisen enriching biological, meteorological, and geological literature.

Captain Davis sailed from Hobart on November 1913. A number of soundings and several temperature series were taken *en route*, and Macquarie Island reached on November 28. On December 5 the voyage was continued towards Adelie Land. There were then on board all the Macquarie Island party, also Hurley and Correll as photographers, and Hunter as chief biologist.

Commonwealth Bay was reached on December 13. Visits were paid to outlying islets, and a considerable programme of oceanographical work and dredging on the continental shelf carried out. On December 24 a terrific hurricane accompanied by blinding snow arose. The anchors broke and dragged. Lying close in-shore with dangerous reefs in the vicinity, all view of the land obscured, and the compasses almost useless,

we came very near losing everything. Davis handled the ship in a masterly way, and after several days' plunging about in such weather the conditions improved. Part of the bulwarks was carried away and the motor launch lost.

Steaming westwards a new addition was made to the western extremity of Adelie Land. The ice conditions were worse than on either of the previous voyages. Soundings and deep-sea dredgings were made regularly. Before a passage was effected into the Davis Sea the ship had to steam west of the ninetieth meridian.

Oceanography and an examination of the Shackleton ice-shelf occupied us until February 7, when the pack was finally left behind. On the return journey a line of soundings was secured, completing a section of the ocean floor between Western Australia and Queen Mary Land. Adelaide was reached on February 26, 1914.

Any success that this expedition has attained is owing to the whole-hearted and unselfish way in which every member applied himself, with no thought of gain other than deserved credit, to the success and advantage of the whole. I cannot say too much for Captain J. K. Davis for his admirable conduct as second in command, and his masterly handling of the vessel.

Frank Wild, leader of the western party, and George F. Ainsworth, leader of the Macquarie Island party, won the sincere regard of the members of their respective parties and the admiration of every one for the splendid way in which they executed the difficult tasks entrusted to them. With a unanimity of endeavour much can be done.

THE SO-CALLED MYTHICAL ISLANDS OF THE ATLANTIC IN MEDIÆVAL MAPS.

(Considered as Evidence of Pre-Columbian Exploration towards America.)

By William H. Babcock.

(*Continued from p.* 320.)

Brazil had other names, which must be considered for any light which they may afford us. The first, and one of the most persistent of these alternatives, appears in the earliest map showing the island, that of Dalorta, 1325, as Montonis.[1] Freducci, 1497, makes it Montanis; Calapoda, 1552, Montorius; an anonymous fourteenth or fifteenth-century map (copied in Fischer's *Sammlung*), Monte Orius. Some of these variations appear in other maps, but they seem to be no more than variations, and all apparently grew out of one word. Montonis in Italian means ram or wether, male sheep; thus (as some say) connecting Brazil with the Isle of Sheep, which is prominent in Edrisi's geographic description and his narrative of the voyage of the Magrurin of Lisbon to

[1] Nordenskjöld, *Periplus*, xxii. Also Santorem's *Atlas*.

the south-west and south; also in the Brandan legend of the same seas. Furthermore, the Faroes were associated with the idea of successful sheep-raising, and in one eleventh-century map[1] are shown as Ysferi, unreasonably near the position which Brazil normally occupies, even allowing for the fact that this map is drawn to fit around a globe.

The substitution of "a" for "o" would give us, however, the "Montanis" of Freducci, and change the name from the Island of Rams to the Island of Mountains. If this were the original form, Montorius would easily grow out of it, and Monte Orius out of that; each embodying the mountain idea, but seeking to put meaning into the latter part of the word. I am not aware that Montonis ever was repeated,[2] whereas there are several perfectly clear repetitions of the mountain name with variations. It is not possible to point out any Atlantic region in the direction of Brazil where sheep could be found. There are no great mountains that way, either, near the coast, but some rather impressive elevations and sheer cliffs occur in parts of the ocean front of the encircling land-wall of the St. Lawrence Gulf.

This must be true of the formidable and forbidding southern side of the Straits of Belle Isle, where the fancy of the sixteenth-century French navigators was somehow excited—perhaps by the evil noises of grinding ice and rock and storm—to picture the colony of "demons" whom you may still see by that name on Remusio's Gastoldi map, flying and prancing with grasshopper wings and short tails, as if enjoying the prospect of a wreck. It is certainly, and still rather savagely, if less diabolically true of the twenty to twenty-five miles of precipice presented by that Grand Manan, most probably the Straumey of the Norsemen, which is named "i bisgebr" on Ruysch's map of 1508. Not far from this on the mainland the mountains still stand all around Passamaquoddy Bay, as Thorfinn's party seem to have reported them in the saga. Also, both Nova Scotia and Newfoundland have rugged ridges of some height and much picturesqueness. The appellation "island of the mountains" need not seem very far fetched. In fact, one outlying fragment was promptly called the Island of the Desert Mountains[3] by Dumonts and Champlain, and is Mount Desert to this day.

Monte Orius bears also a plain implication of gold, which men were always hoping for in the new lands. There may well be no more than a coincidence in the fact that Nova Scotia probably contains more gold than any other region east of the Black Hills and Colorado. Most likely this name really records only a misreading of some blurred copy, taking shape from such wild tales[4] as were afloat of sands in great part gold brought back by visitors to the Isle of the Seven Cities.

In some of these instances the name is placed on a blank band crossing the island like a label. This has sometimes been misunderstood,[5] Montorius being taken for the name of a distinct or interior area, Brazil for

[1] Santorem, *Atlas*, Part i., the Cottonian map.

[2] Unless in the disjointed and uncertain Pizigani name now reading *no cotus*.

[3] *Orig. Nar. Early Amer. Hist.*, "Voyages of Champlain," p. 81.

[4] Batalho-Reis, "The Supposed Discovery of South America before 1448," *Geog. Journ.*, London, vol. ix. p. 196, quotes Galvao.

[5] Nordenskjöld, *Periplus*, p. 164.

that of the whole island. The distinction has no real warrant whatever. The band or label was a matter of convenience only, and sometimes was of service for both names, as in the exceedingly important map of the Pizigani brothers, which has preserved some unique items, but has dealt loosely with other details, perhaps being also misled by indistinct originals or copies of earlier maps and dealing partly with words of an unfamiliar tongue. The inscription referred to, as given in Jomard's *Monuments of Geography and History*, by all odds the best reproduction, is arranged as follows :—

Ysola de no corus sur de brazar

only the last word overrunning the name-space. There is no doubt about it, nor about any of the others, except the one divided by the border, which here probably eliminated a second "n." The first "n" should be read "m," these two letters being sometimes interchanged[1]—see the "ha*m*c," "Arago*m*," "Ca*m*aria," and "Ma*m*," of Pareto's 1455 map. Also "c" and "t" in some early scripts were easily mistaken, whereby we perhaps get the puzzling Estotiland of the Zeno map for an original Escociland. With such corrections, the double name would be Island of Montorus (Montorius) or of Brazil. This is not an incontrovertible rendering, but seems the best thus far offered. Bianco's 1448 map[2] supplies the double name "$\frac{a}{y}$ de brazil de binar" (probably bimar), which we may render the Island of Brazil of Two Seas. The qualification is obscure, but perhaps relates to the expanse of water behind as well as before it, or possibly to the exterior ocean and an inner gulf or sea (as in the Catalan Atlas of 1375[3]) not actually shown by Bianco. Old maps now and then mentioned features which they did not show.

Fra Mauro's reference to the Fortunate Islands, of course, does not mean the Canaries, then well known. Divers other groups were sometimes thus entitled : the Madeiras, the Fortunate Islands of St. Brandan ; some of the Cape Verde Islands, as the Fortunate Islands of Majo Bon, and also perhaps a few of the Islands of the Sun. The plural Italian word "isole," as used by Fra Mauro, would literally mean more than Brazil, unless we understand the double form of the latter shown on some maps. Apparently the sense is that Brazil, whether one island or more, is called the Fortunate Islands and belongs to Ireland. The chief value of the entry is in attesting the supposed importance and delightfulness of Brazil.

The I and Y of the old maps were freely interchangeable as the initial of Insula, Illa, Ilha, Isla, Isola, Inis, or Island. Later Hy and even O' were needlessly substituted, perhaps by mispronunciation in the first place, and a local habit of nomenclature in the second.

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[1] Kretschmer, *Entdeckung*, Taf. v.
[2] Fischer, *Sammlung*, xi.
[3] Nordenskjöld, *Periplus*, Plate xi.

O'Brassil may have first appeared in the *Ptolemy Argentina* of 1513, copied as Plate xxxv. of Nordenskjöld's *Facsimile Atlas*, or perhaps in a Portuguese Marine Chart credited by Lelewel to 1501-1504. In the next century it was next mentioned by Hardiman, the historian of Galway, as an island on old maps and sometimes visible. It afterwards was adopted as O'Brazil or O'Brasil into the literature of imagination, especially poetry. The rather fantastic forms Hy Brazil and O'Brazil have contributed to the aura of mystery and enchantment surrounding the elusive legendary island; but they do not lead the way to any real Brazil.

Sometimes the possibility of sunken lands has been suggested in explanation. If Porcupine Bank, or the immediate neighbourhood of the lonely pinnacle of Rockall, were ever, during historical times, above the surface as a considerable and attractive island, since submerged in some cataclysm or by gradual descent, the problem might be solved in that way in the absence of any positive opposing evidence. The case for Porcupine Bank rests mainly on its relative nearness, the coincidence of its direction with that of Brazil in one or more moderately early maps, and the numerous coincidences of legendary islands with reefs or nearly uncovered shoals on the same spots contiguous to the western Irish shore. The case for Rockall rests on the fact that a bit of the area in question is still permanently above water, and patches of the remainder are nearly so;[1] that some seventeenth-century maps show Rockall as of greater area than at present, and that some indications of submergence have been reported from the neighbourhood of the rock itself—with, of course, whatever support may be derived from the coastal coincidence above mentioned. But the *Ptolemaus Argentina* of 1513 seems to show the Porcupine Bank as such in its proper position, and plainly shows Brazil in its usual location opposite the Blaskets: also the 1634 map of Tassin, geographer to Louis XIII., which shows Rockol (Rockall) as consisting of an elliptical main island of some size and a lesser island, also shows Brazil much farther out and more southward, it being nearly heart-shaped with the apex pointing upward. In neither case can Brazil be the known land, emerging or submerged, which thus bears it company. Some other hypothesis is needed for its appearance in these instances: hence the conjectural identification of Brazil with sunken land fails altogether.

As to form, the general rule is established by a very long succession of maps, each showing west of southern Ireland and usually of considerable size, with slight variations of outline, an approximately circular or full-moon-shaped insular Brazil. They include Dalorto 1325, Dulcert 1339, Atlante Mediceo (Laurenziano-Gaddiano) 1351, Pizigani 1367 and 1373,[2] anon. Weimar map 1424 or 1481,[3] Giraldi 1426,[4] Beccaria 1426[5]

[1] Miller, Christy, "Rockall," *The Scottish Geographical Magazine* August 1898, p. 411.

[2] Studi, 1st and 2nd Ital. Geog. Cong. 1875, Plate vii.

[3] Original in Grand Ducal Library, Weimar.

[4] Fischer, *Sammlung*, viii. (1881).

[5] Original in Royal Library, Munich.

and 1435,[1] Zuan da Napoli perhaps 1430,[2] Bianco 1436[3] and 1448,[4] Valsequa 1439,[5] Pareto 1455, Fra Mauro 1459, Benincasa 1467[6] and 1482,[7] Roselli 1468,[8] Sfax 1009 of the Hegira, Luzerne map perhaps 1489,[9] Bertran 1489,[10] anon. Portuguese map 1490, Schedelius 1492, Juan de La Cosa 1500,[11] Reinel 1505,[12] and numerous others, mostly later.

Small and remote representations of Brazil—mostly of the sixteenth, seventeenth, or eighteenth century—have already been mentioned. Beside these variants there are certain significant types of Brazil, as shown in early maps, which diverge widely from the normal in the matter of form and structure, though retaining an approximately circular general outline. Thus the Catalan Atlas of 1375[13] reduces the land area of Brazil to a mere ring enclosing a circular water, whereon eight islets are dotted. Nordenskjöld[14] suggests as an explanation the myth of the Island of the Seven Cities; but this was early identified with the southern Antillia, not the northern Brazil. The islets seem eight in number, not seven; cities have no necessary connection with islets, and the later Spaniards felt no incongruity in searching for these particular cities through the deserts and mountains of south-west America. Also there is the enclosed gulf or great water to be considered, which this conjecture leaves unaccounted for.

Again, the "Catalan Map circa 1480" of Plate xx. of Westropp's *Brazil and the Legendary Islands of the North Atlantic*, cited also by Nansen[15] as of the end of the fifteenth century, exhibits "Ylla de brazill" in its usual position about opposite the Blaskets, though further out, in the same longitude as the nearer border of Iceland. Its circular general shape is approximately retained; but it is divided by a channel from east to west, making two islands. The same occurs on a portulan chart of the Woodbury Lowery collection, supposed to have been made in 1501 or 1502, the maps of Prunes 1553[16] and 1586,[17] Mercator 1569[18] and 1595,[19] Olives 1568,[16] 1584,[17] and other maps,[20] excepting

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[1] Studi, 1st and 2nd Ital. Geog. Cong. 1875, Plate viii.

[2] Kohl Collection, 17, Library of Congress.

[3] Kretschmer, *Entdeckung*, Taf. iv. Nordenskjöld, *Periplus*, Plate xx.

[4] Fischer, *Sammlung*, xi.

[5] Original in Majorca. Good copy owned by T. Solberg.

[6] Nordenskjöld, *Periplus*, Plate xxxiii.

[7] Kretschmer, *Entdeckung*, Taf. iv.

[8] Stevenson, Portulan Charts, reduced. Original with Hispanic Society.

[9] Santorem.

[10] Original in Florence: Archivo di Stato.

[11] Kretschmer, *Entdeckung*, vii. Nordenskjöld, *Periplus*, xliii.

[12] Kunstmann, *Entdeckung*, Bl. iii.

[13] This form repeated in Catalan map. Kretschmer, Taf. iv. (seven islands).

[14] Nordenskjöld, *op. cit.*, p. 164.

[15] Original in Milan. *In Northern Mists*, p. 281, map. Nordenskjöld, *Bidrag till Norden's Adstra Kartografi* (1892), Plate v.

[16] Kretschmer, *Entdeckung*, Taf. iv.

[17] Nordenskjöld, *op. cit.*, p. 164 (cited).

[18] Winsor, J., *From Cartier to Frontenac*, p. 64, map.

[19] Nordenskjöld, *Facsimile Atlas*, p. 95.

[20] Southey, R., *The History of Brazil*, vol. i. Appended Notes, p. 5, concerning J. Ortiz' maps.

that the division is generally from north to south and the channel somewhat curved—in the Prunes map of 1553, for example.

Two explanations of this have been offered: one by Nansen,[1] straight out of mythology, that the dividing channel is no other than the River of Death; the second, suggested in a letter from Mr. Westropp, and perhaps still unpublished, that the name-space, extended across the island in some instances as stated, may have been understood as the absence of land and thus copied by some later map-makers, a like error having occurred in the case of England and Scotland. Certainly such an error is not impossible; but the Roman wall across Great Britain, looking like a narrow canal in some delineations, was the real cause of the latter division, and was much more liable to such misinterpretation than the relatively broad name-blank of Brazil. Usually the presence of the name thereon would also be a guard. Besides, the difference in direction of the channel on different maps and the curvature seem to call for further elucidation.

Finally, the map of Pinelli, 1384, standing quite alone, represents Brazil nearly in the form of the letter C, with the open mouth presented toward Ireland. The position is slightly more southerly than usual, bringing it below the parallel of Cape Clear and about on that of Land's End.

The question naturally arises what real land, if any, there is west of the Blaskets, Ireland, and south of west of Limerick, having an anterior sheet of water with islands in it, the region being divided into two parts by a water-channel and the inner sheet or gulf communicating with the Atlantic by a mouth that opens toward Europe? There is no possible answer except "the projecting elbow of North America immediately surrounding the Gulf of St. Lawrence, and made up by what we now call southern Labrador, a portion of eastern Canada, New Brunswick, the neighbouring corner of Maine, Nova Scotia, including the hardly severed Cape Breton Island, and the great independent fragment of Newfoundland." The islands of the gulf are Anticosti, Prince Edward's, the Magdalens, Brion's Island, etc.; nor should we expect in any mediæval map strict accuracy as to numbers or relative sizes, seeing that the very well-known Lake Corrib (Lac Fortunatus) is liberally strewn with map-islands far more plentiful than in reality to suit an extravagant legend. We may picture the Catalan map-maker similarly dotting in his islets from some vague report.

The omission of any entrance in this instance may be strange, but both entrances are small in proportion to the land front. Cabot and Cortereal have been supposed to have mistaken Belle Isle for a mere *cul de sac* like Hamilton Inlet, and Cartier,[2] after sailing through it into the Gulf of St. Lawrence, was so uncertain as to any other opening that he could only speak of the *probability* that Newfoundland was an island. Moreover, such ignoring of the two straits cannot be accounted a greater divergence from fact than the multiplying of them, which has turned

[1] Nansen, Fr., *In Northern Mists*, vol. ii. p. 228.

[2] Winsor, J., *From Cartier to Frontenac.* Also *Original Narratives Early American History.*

that great island into an archipelago on well-known maps of later date. In view of these facts, it might well happen that a delineator, drawing on the basis of a narrative of one who was chiefly impressed by the great inner gulf, its islands, and its land shell, would fail to show any gateways from the outer sea.

The circular form of both water and surrounding land belongs naturally to a certain artificial tendency of the times, which first chose a set figure to cover partial ignorance and then adhered to it to save trouble. Inspection of the map will show divers Canarian and Azorian islands treated in this way, Madeira at one time being a crescent, as were nearly always the Atlantic Man and Insula in Mar; Antillia and Salvagio were elongated rectangles with indentations in prescribed series along their coasts, and the persistent island at the north-east corner of Scotland, originally intended for Orkney or Caithness, made habitually as perfect a circle as Brazil itself. If any suggestion from reality was needed in the latter case it would be found in the rough apparent curvature of the exposed front, and the inference that the other parts of the enclosure would be like it rather than otherwise. It would be easy to treat the Gulf itself in the same way.

This Catalan form is in fact more artificial than that of Sylvanus 1511, above mentioned, which is nearly square, a term explicitly applied to it ("Gulfo Quadrata") by Gomara forty years later. The real outline is perhaps more like a slightly elongated bicornate skull, having the St. Lawrence estuary for one diverging horn and another tapering to the Straits of Belle Isle. Champlain's map of 1612, as given in Winsor's *From Cartier to Frontenac* (p. 102), broadens the horns, especially that on the north-east, giving its borders a slight curvature opposed to the concavity of the south-west, so that the outline is ovoid, and with a little more stretching at right angles to the main axis would become as circular as the inner water of the Catalan Brazil.

But if one observer would have his attention chiefly directed to the interior location of that sea, another might be impressed by its main entrance—if approaching by that way—and enlarge its proportions a little, instead of minimising and forgetting it, this would give us something like Pinelli's version.

Again, there would be those—like the unknown navigator who supplied the data to Sylvanus—who would note both the entrances and the consequent severance of Newfoundland from the land behind it. This latter idea might easily result in a rather narrow channel, such as we see in Gastoldi's map of about 1550, before mentioned, running north to south behind Newfoundland from the Straits of Belle Isle to the front of Cape Breton and the Atlantic. Ramusio and Gastoldi seem to have well understood that continental land or a densely packed archipelago of large islands lay behind this channel, but the same conception, applied to a divided insular mass, would give us in substance the double Brazils of Mercator, Prunes, and the rest. The unusual and chiefly earlier presentation of division by an east and west channel might grow out of the supposition, long afterwards current, that the salt estuary of the St. Lawrence River, not yet ascended, was a strait leading

to the ocean beyond. When Cartier found the banks drawing together, and learned from Indians that the water would soon become fresh, he turned back disappointed to search elsewhere for a passage, and went on up into fresh-water America only when this hope had left him. Such a strait, if existent, considered with the Straits of Cabot and the intervening gulf, would divide this new western land into two sections, a northern and a southern, with the sea both before and behind it, therefore, presumably all around, apparently the ideal of the earliest (1480) example of a divided Brazil.

Of course it is quite true that a mere difference in the direction of the dividing channel may be wholly due to accident or to vagueness of information. But it remains true that the region in question supplies two channels of division, one real and permanent, the other partly so, and in part almost equally trusted matter of former hope and belief, long since refuted. Either one of these would afford a basis for the divided Brazil of the maps. Now it is perhaps hardly possible to point out in any direction any other mass of land adapted to cause the various delineations of Brazil according to different points of view: and certainly there is none in the direction from Ireland prescribed by the maps.

A word must be given to other Brazils. Beside the South American Brazil, the Crescent Island, most often called Man or Mayda, shares the name Brazir (Brazil) with Terceira of the Azores and the large circular primary Brazil in the latitude of Ireland, all but the last being pretty clearly imitative and derivative. Apparently the map-makers were ill supplied with names and made one do the work of several. Another and rather puzzling instance of duplication appears in the Catalan map of 1480, above mentioned, which shows in the same latitude as its divided Brazil, but more than twice as far westward, a second Brazil of the solid circular disc type. This is south-west of Iceland, and immediately south of a great island marked Illa Verde and apparently intended for Greenland. In such relations it can only be Labrador and neighbouring territory, brought much nearer Greenland than in fact, possibly by some suggestion of intercommunication. More than any other map, it seems to support Dr. Storm's identification of Brazil with the Norse Markland, apparently accepted by Fischer also.

But this Catalan has strangely put the solid Brazil of older delineations (opposed to that of the first great Catalan atlas) on the only part of the map where there is anything to suggest his other more eastward Brazil, before mentioned, which is divided in two. Perhaps it is an instance of accommodating new data to old geographic ideals, such as we find conspicuously in Bianco's map of 1448, for example. The Portuguese who drew two Brazils in about one latitude undoubtedly was familiar with the then very old convention of a solid circular Brazil on that line and not very remote from Ireland. If he had further heard that Brazil was as far west as Greenland, also that Brazil was divided in two parts, he might have compromised by assuming two Brazils and giving the divided form to the one nearer the older position. At least there seems no better answer to the problem.

Against the identification of Brazil with a part of America stands

the absence of that word from the Norse sagas and records, and as a geographic name from Irish literature before the sixteenth century. At a time when the relations between Iceland and Ireland were intimate and many people of the former country were partly of Irish descent, these northerners knew nothing of Brazil by that name, but knew very well Great Ireland and its alternative name Huitramannaland—Whitemensland. The silence of Irish writings is the more remarkable in view of the continual passage of traders[1] from the south along its western coast, some of whom surely must have brought with them the Italian and Catalan mariners' charts that showed Brazil by name beyond the Blaskets. Again, when the celebrated Bristol expedition of 1480 returned from its long cruise after Brazil, it put first into a harbour of western Ireland, but was chronicled in England only, although the ties between Bristol and the west Irish towns were peculiarly intimate. Perhaps little can be said of these difficulties except a reminder that different names were used in different places for most remote regions, so that the absence from one quarter of a name prevalent in another does not demonstrate that any doubt existed as to the reality of the island.

Reviewing all of the evidence, it seems likely that the part of America mentioned, especially Newfoundland and neighbouring shores, had been visited very early by Irish-speaking people; that the commendatory name Brazil, given by them, adhered permanently, though it did not become exclusive; that it was also shared by Terciera in emulation or imitation; that the dyes of the latter island became associated with the name, which accordingly might be applied wherever red dye-wood might be found; that the original Brazil, perhaps by over caution, was brought back eastward on the maps to the neighbourhood of Ireland, but afterwards carried over to Newfoundland again in some instances,[2] and finally set in the middle of the Atlantic, both for reasons already explained; and that it finally vanished from the maps about the middle of the nineteenth century.

In the long interval between the first finding of Brazil and the historic voyages of Cabot and Cortereal there were at least two other visits (by the Norsemen of Greenland), who called it, or a part of it, Markland respectively in the beginning of the eleventh century and in the middle of the fourteenth. There may have been other visitors, too, from that quarter as well as from the warmer regions of Europe. There is no evidence of these, however, which will bear any great strain.

As yet we can give no good guess as to the date of the supposed visit which supplied an Irish name. Vigfusson, as before stated, calculated from pedigrees and other data that the adventure of Are Marsson in Great Ireland preceded by some years the end of the tenth century. But Are was supposed to have found the region already thus known. The alternative name Whitemensland, seems to mean the Land of Men wearing White Vestments. Monks or priests would be less likely to push so

[1] Westropp, T. J., *Early Italian Maps of Ireland from* 1300 *to* 1600, *with Notes on Foreign Letters and Trade.* Published by Royal Irish Academy.

[2] Yet the map of J. Carolus, 1626, shows it farther eastward. Bjovribo and Petersen, *Anecdota Cartographia Septentrionalia*, Plate xi.

far after the zeal for religious exploration faded, and the Norse sea-rovers took to breaking up monasteries and barring the waterways. Naturally one inclines to ascribe such an unremitting westward push to the impulses which brought Irishmen to Iceland and sent them two hundred miles (by estimate) beyond it in the latter part of the eighth century. But any long-continued settlement must have left more certain and trustworthy traces than have thus far been found. Indeed, after much search by those interested, there is not one single uncontroverted item of this nature.

Averments of casual visits, however, cannot be refuted by mere lack of such evidence; for what New World relics have we of John Cabot or Cortereal? These are proven mainly by records on maps and off them, and in the case of Cabot by some contemporary correspondence, luckily preserved. Brazil has no narrative epistles, no governmental entries. Its case rests mainly on the maps and the long general prevalence of northern belief in such a far westward Irish discovery. This is not proof, but a reasonable basis for moderate probability.

Daculi, the Cradle Island.—This, though less renowned, shares with Brazil the record for first appearance of all Les Iles Fantastiques.

Dalorto's map of 1325, already mentioned, presents many islands of familiar and of unfamiliar names, in the neighbourhood of Ireland and Scotland. Nobody can mistake the rightly located Man, Bofin, and Braschia. Insula Scuz must be Skye, though with the outline of the Kintyre peninsula. Sialand seems to be Shetland. Tille may be Orkney displaced. Galuaga or Saluaga probably stands for the main body of the outer Long Island. A batch of others may be assigned rather loosely to the inner Hebrides, the names giving little aid. Bra has always been read as Barra, though shown out of line with Galuaga and too far eastward. Brazil or Montonis is farther out to sea, opposite the Blaskets, as stated. Finally, Daculi lies in the Atlantic off the north-western corner of Ireland, north of Brazil and west of Bra, with which it has a curious legendary connection. With Montonis it is linked in another way by their Italian names—Cülla being "cradle" in that language, plural Culle, easily modified to Culi by erratic Pizigani spelling and introduced by the preposition "da," in one use especially indicating nativity. Thus "Zuan da Napoli" means John born in Naples or Napoli—that is, John of Naples in this sense. The blending of preposition and noun in Daculi is no more than sometimes happened on the maps to Liconigi —Li Conigi, the Rabbit Island—now long known as Flores. This interprets I. Daculi as the island of the cradles, or Cradle Island.

The items of name and situation above given, explained by a certain inscription soon to be considered, forcibly suggest St. Kilda, which has been advocated on other grounds as the original of Daculi—the most plausible identification yet advanced, as it appears to me. It is true that Barra is south of the parallel of that lonely cliff-island beyond the outermost Hebrides, whereas the islet of North Barra is about equally far above it, but we cannot hold these mapmen of the older time to absolute accuracy in such a matter, and a fair average of position between the two would not be far out of line with St. Kilda. Nor need the fact

that no island exists on the site of Daculi count seriously against this conjecture, for the displacement would not be much, if any, greater than in the case of Barra and divers other instances. St. Kilda, lost in the mists and mystery of the Atlantic, of holy and miracle-working associations and out of touch with most tests of reality, seems the very place to be linked to some more commonplace island by a fanciful contribution of saintly white magic, a rumour originating nobody knows how.

But before considering this last we may briefly review, in order, a few maps of later, though still early, date. Dulcert 1339 shows some irrelevant changes farther north and east, but the Hebridean islands repeat very nearly the form of Dalorto 1325 (believed by many to be the same man), and there is no significant change in Bra or Daculi, though the first syllable of the latter becomes Di.

The Atlante Mediceo of 1351 makes more Hebridean changes than Dulcert, and leaves sundry islands unnamed, including the one which, by position, seems meant for Barra. Instead of Daculi we have Insul Raghi (as nearly as it may be read) with a considerable expansion of area. It is but a short distance from Aran Island of Donegal, not so named. The unknown cartographer was strong in the faith of Daculi and exaggerated it; but his map does not help the solution of the problem.

The map of Pizigani brothers 1367 modifies many names: Man becoming Insula de Ma; Skye, Ysula Suz, and Daculi, Insuldacr, given as one long word. But the place of the last remains nearly as in Dalorto's map, though most of the other islands are drawn nearer Ireland, so that Bra is nearly stranded thereon, being no longer in quite the same latitude as Daculi, though they are plainly the same pair of islands. A line of inscription appears to relate to the former island, possibly to both: "Ich sont ysul e Babundi honó quó morit may." Perhaps it needs some recasting to be fully read: thus, honó may be homo, and may mar. I will not attempt to decipher it.

Pareto's fine map of 1455 has the following more extended and significant legend concerning Daculi: "Item est altera insula nomine bra in qua femme que i insulla ipa habitant no paruntur sed quando eo4 (?) tempus pariendi seruntur foras insulla et ubi parientur secundu tempus." Some elements of this are obscure, but at least we can gather the assertion of special aid in the matter of child-bearing afforded by the outer island, Daculi, to women carried thither after being baffled in the inner one, Bra; and see readily the appositeness of the name Cradle—applied to the former. The position of these two islands differs little from that shown on Dalorto's and Dulcert's maps, and many other features are of accepted type. Aran is named Braconal; Achil is named Ardoin; Galuaga, perhaps Harris and Lewis, is too greatly reduced in size, taking the name Sagia.

Beccaria 1435 had already made this change in size, although adhering to the former name, the initial G being, however, little removed from an S, into which letter it no doubt soon passed on some maps. A more relevant item is his separation of the preposition from the noun, and the doubling of the last consonant, making the name Insula da Culli, an almost exact presentation of the form and meaning which we have divined.

No other maps add anything of importance, and the case for St. Kilda as the Cradle Island must be left as it stands. It seems to be the only important British island in which a saint's name with that title still survives. Furthermore, no great stress of popular mispronunciation would be required for turning Culli into Kilda in course of time. But whether these facts are more than coincidences I am unable to say.

PTOLEMY'S ATLAS: FOURTH ARTICLE.[1]

By G. Schütte, Ph.D.

(With Illustrations.)

The Map of Dacia.

In our first article (vol. xxx. p. 57) we assumed that the Ptolemaic map of Dacia is derived from two duplicate prototypes (p. 66). Further investigations — especially a detailed comparison with the Tabula Peutingeriana—have supplemented or corrected our provisional assumptions on several points. The following article summarises the main results of these investigations. We have to thank Prof. Jos. Fischer, S.J. (Feldkirch), for sending us a photograph from the Codex Urbinas 82 which has served as the basis of the new observations.

a. *Relations between the Different Prototypes.*—We assume a fundamental physical map of Dacia which we propose to call Ac, the letters "Aa"

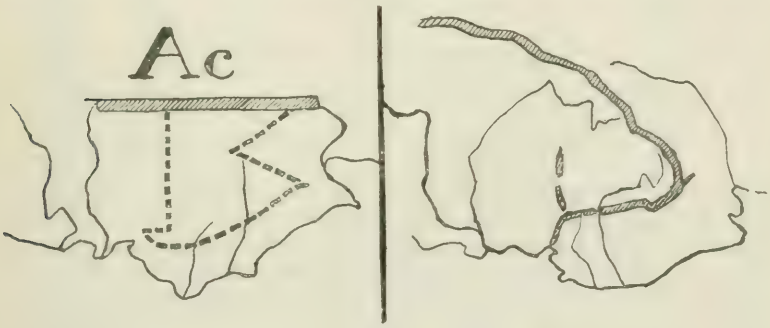

Fig. 1.—The Ptolemaic prototype Ac (to left), contrasted with a modern physical map of the region of the Lower Danube (to right).
- - - - marks the limit of Prototype Ae, coinciding with the presumed mountain chain of Ac.

and "Ab" having been used for prototypes assumed in Germany and Denmark. Ac had a relatively good design of Dacian rivers. It also seems to have contained a complete design of the Carpathian mountains. The southern half, however, is only indirectly traceable, namely, within

[1] For earlier articles see *S.G.M.*, vol. xxx., pp. 57, 294, and 617.

the limits of our assumed prototype Ae, which the constructor of the Ptolemaic map identified erroneously with the Transylvanian chains of Prot. Ac (cf. Fig. 1). The constructor has localised Prot. Ac correctly, and, as a matter of fact, he could scarcely avoid doing this, because the notable bend of the Danube in the present Hungary offered such a conspicuous landmark.

Most of Ptolemy's Dacian towns belong to the itineraries Prot. Ad and Ae, which were originally duplicates of each other (Cf. Fig. 2, which shows the series of duplicates in a conspicuous manner). Neither of them could be identified with Prot. Ac, because their contents do not

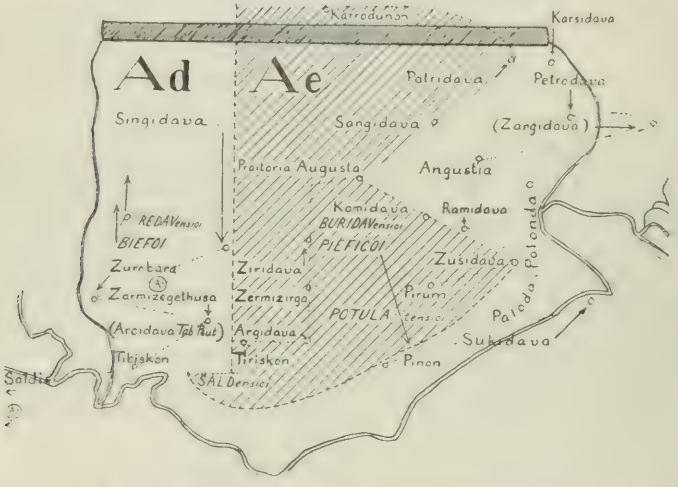

FIG. 2 —Duplicate Series of the Prototypes Ad and Ae.

(A) } =the direction towards Alvona in Istria, possibly belonging to Ad.

(A) =the place of the Albokensioi (Albonensioi?), possibly belonging to Ae.

agree with the physical framework of this prototype. Ac has, on Ptolemy's map, preserved its place along the rivers Danube, Theiss, and Sereth or Pruth, but its middle parts have suffered displacement towards the east and west, thus leaving the interior of Dacia open to the contents of Ae. The latter prototype on the Ptolemaic map has been moved back from the rivers mentioned, but its middle and northern parts remain correctly localised. The so-called "tribe" Saldensioi of Ae is the Sallis of Ad, and the Saldis of the Tabula Peutingeriana, a town in Lower Pannonia, south-west of the Danube. Zusidava of Ae is the Sukidava of Ad, the Sucidava of the Tab. Peut., a town in Lower Moesia, on the southern bank of the Danube. The two names seem to be extreme outposts of Prot. Ae towards the south-west and the south-east, and they show that the prototype was on this side practically limited by the Danube. We may assume the same limitation for the twin prototype Ad. The incorrect combination of Prot. Ad and Ae re-appears on the Tabula Peutingeriana (cf. Figs. 3 and 4).

In independent Dacia north of the Carpathian mountains, a distinction of the prototypes Ac, Ad and Ae is not possible, because here the

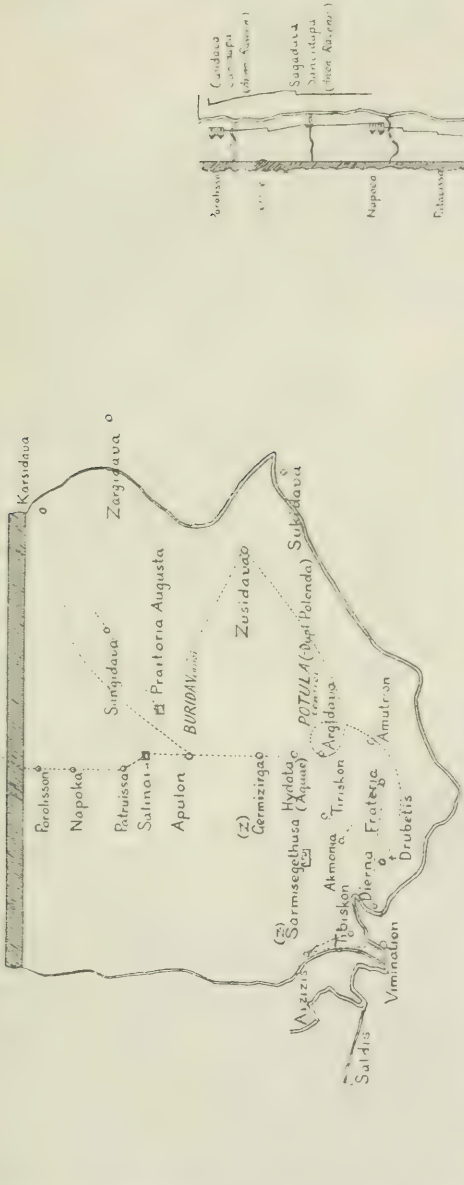

FIG. 3.—The Ptolemaic towns of Dacia, reappearing on the Tabula Peutingeriana.

FIG. 4.—Tabula Peutingeriana, Section Dacia. The eastern part of the map is shifted from the horizontal to the vertical position.

evidence of the duplicate series and the Tabula Peutingeriana fails us. But we may distinguish the areas of the surrounding prototypes.

The frontier between the Ptolemaic sections Sarmatia and Germania is at the same time the frontier between Acde and the correctly localised prototype B1, describing the mercantile road from the middle Danube to the inferior Vistula. Contrast of duplicates: Burgiones Acde = Lugoi Buroi B1 (= the triplicate *Buriones (Kuriones) B2, displaced to the interior of Germany).

Further north, the Sarmatian side of the so-called "Vistula" is covered with the displaced tribes—*Ambrones, *Ouarinoi, *Burgundiones, *Gutones, Finnoi, altogether Baltic tribes, derived from Prot. E. The same prototype may lay claim to some invaders in Roman Dacia, viz., Teuriskoi = Tauriskoi in Hohe Tauern, Kotensioi (Kontekoi Cod. Athous Vatoped., map) = the Celtic Coteni in Bohemia, and Ratakensioi = Ptolemy's Rakatai in Nieder Oesterreich (čech. Rakousy).

On the northern and eastern frontier, from the Vistula to the Black Sea, the area of Acde collides with that of Prot. F, describing eastern Europe and western Asia. This prototype betrays its existence constantly through "ethno-topic" combinations, *e.g.* Venedai with Venedian gulf and mountains, Amadokoi with town Amadoka and Amadokian lake and mountains, Harpioi with town Harpis. Contrast of duplicates: Karpianoi Acde = Harpioi F.

b. *General Topographic Scheme.*—The relatively correct physical map Ac may be compared with Ptolemy's physical map of Germany which may be called excellent, if we remember that the cartographer must be to a great extent describing regions which had never been conquered by the Romans.

The Ptolemaic arrangement of the Dacian towns generally agrees with the routes of the Tabula Peutingeriana and the description of the Anonymus Ravennas. If differences occur, the Ptolemaic map generally seems to be preferable.

The Tabula, *e.g.*, assigns Tivisco No. 2 (Tiriskon Ptol.) to the route Tierua-Sarmategte (= Dierna-Zarmizegethusa Ad), and A(r)cidava No. 2 (Argidava Ptol.) to the route Drubetis-Rusidava (= Drubetis-Zusidava Ae). This arrangement must be rejected, because it is contradicted too distinctly by the Ptolemaic map. The latter contains the following duplicate series:—

Ad. Sallis-Tibiskon-Zarmizegethusa-Zurobara-Singidava.
Ae. Saldensioi-Tiriskon-Zermizirga-Ziridava-Sangidava.

Here we are indubitably faced with an original route which has been dissolved by the author of the Tabula, who transplanted Tivisco No. 2 from Ae to Ad. As to A(r)cidava No. 2, its alter-ego has disappeared on the Ptol. map. But as the Tabula connects Arcidava No. 1 with Tivisco No. 1, it is obvious that A(r)cidava No. 2 ought to be connected with Tivisco No. 2. Consequently, it does not belong to the route Drubetis-Rusidava (Zusidava), but to the route Saldis-Tivisco, etc.

We assume that Sagadava Tab. Peut. in Moesia inferior (= Sancidapa Anon. Ravenn.) is identical with the Ptolemaic Zargidava Ad, a triplicate of Singidava Ad and Sangidava Ae. The displacement from the northern side of the Danube to the southern was most likely due to erroneous identification of Karsidava (Ptol.) with the Moesian Capidava.

c. *Statistical Features.*—Ac seems to have been a blind map. At least so many names are claimed by the duplicate series of Ad and Ae, and by the supplementary road descriptions of the Tab. Peut., that very little is left.

Ad and Ae seem to have contained some tribes, cf. the duplicate Biefoi Ad = Piefigoi Ae. But several so-called tribes are in reality inhabitants of towns: P(u)redavensioi Ad = Buridavensioi Ae = Burridava Tab. Peut.; Saldensioi Ae = Sallis Ad; Potulatensioi Ae = Paloda Ad, Potula Anon. Ravenn.; Albokensioi (Ae ?, perhaps = Alvona Ad ?). Cf. (Ap)piarensioi in Moesia.

In the north-western periphery, along the Vistula, no towns appear. This is a contrast with the scheme of Prot. B1.

Neither Ad nor Ae knows the system of "ethno-topic" combinations, so typical of Prot. F. And it is just in Dacia that there would have been rich application for it, as appears from the above-mentioned fictitious names of tribes.

d. *Occurrence of Duplicates.*—Our Fig. 2 in most cases may speak for itself. Only some few names require particular explanations.

Zarmizegethusa Ad = Zermizirga or Germizirga Ae. C. Müller in his edition of Ptolemy supports the Ptol. Germizirga by the reading Germizera of the Tab. Peut., and by a Roman inscription ("no. 1395") with the form Germisara. But the chasm between these forms and Zarmizegethusa is apparent. Cf. the Ptol. varieties Zarmigethusa, Sarmisegethusa, inscriptions Zarm- and Sarm-, Dio Cassius Zermizegethusa LXVIII. 9, Anon. Ravenn. Sarmazege, Tab. Peut. Sarmategte, and river Sar(mati)-getias Dio Cassius LXVIII. 14. Zermizirga is quite close to the varieties Sarmazege and Zermizegethusa. Evidently, the spelling was varied, according to the different pronunciation in Latin, Sarmatian, and Dacian.

Paloda or Polonda Ad = Potula-Ae. C. Müller supports the reading Polonda of the Cod. Vatican. 191 by the Pelendoua of the Tab. Peut. But the stations "Castris nouis, Pelendoua" are by the Anon. Ravennas rendered thus: "Canonia, Potula." Canonia is a misunderstood abbreviation Ca. noua or Ca. nouis = Castris nouis. And Potula is = Pelendoua Tab. Peut. = Potulatensioi Ae. Thus the identification of Pelendoua with the present Palilula ("Palitula" C. Müller) must be withdrawn. Karsidava Ad = Karrodunon Ae. The Tab. Peut. renders the latter name as Cersie. It seems to be the present Krosno north of the Dukla defilé. Singidava Ad = Zargidava Ad = Sangidava Ae. This is a triplicate, cf. above. The author of Ad seems to have doubled the route leading from Sukidava to *Sangidava, etc. South-west of Singidava Ad lies Zurobara, which is a duplicate of Ziridava Ae; at the same time, Zurobara may have absorbed a duplicate of Sukidava, which is in Ae called Zusidava.

e. *Linguistic Marks.*—The following Latinisms occur within the area of Acde: Salinai, *Transmontanoi, Karpianoi (termination), Pir*um*, Kars*um*, Sall*is* (dat. plur.); Pie*ng*itai, An*gu*stia, Sin*gi*dunon, San*gi*dava, Sin*gi*dava, Zargidava (< *San*gi*dava). No spelling with the Greek -gg seems to be supported by all Ptolemaic MSS.

The absence of Greek marks forms a contrast with the area of Prot. F. (eastern Europe).

f. *Literary Milieu.*—The physical map Ac may have been designed before the Roman conquest. Agrippa knew already the frontiers of Dacia, and its longitude and latitude. At the times of Strabo, the country was regarded almost as a Roman tributary state, cf. his Geography VII., p. 305. Thus the construction of a physical map was no less possible than in unconquered Germany.

The itineraries Ad and Ae date from the period after the conquest, as they contain usually the garrison city Prætoria Augusta. As their Ptolemaic combination reappears on the Tabula Peutingeriana, they must have been amalgamated before Ptolemy's times. The Tabula has not simply extracted Ptolemy's maps, because it preserves the road system which Ptolemy has eliminated. We may try to imagine the successive processes of construction.

(1) Physical map Ac, before the conquest. Blind, or with few names only.

(2) Itineraries Ad and Ae, duplicates; descriptions of the conquered regions along the rivers Danube, Theiss, Aluta, Sereth, and Pruth; containing in common the garrison city Prætoria Augusta Ae = Angustia Ad, and a mercantile station with Latin name, viz. Pirum Ae = Pinon Ad; otherwise, the common nomenclature is purely Dacian.

(3) Differentiation of Ad and Ae, through additional names, partially of Latin origin. Salinai and *Aquae (Hydata) Ae = Salinis and Ad Aquas Tab. Peut. Ulpianon (Ae?), garrison city of the Cohors Ulpia. *Pontes Trajani? = Zeugma (Ad?). The most important addition is the continuation of the route *Saldis-Ziridava to Porolisson and through the Dukla defilé to Karsidava (Karrodunon, now Krosno). The Cohors Ulpia built a part of the road in the year 109, according to an inscription.

(4) Amalgamation of Ac, Ad, and Ae, with preservation of the road system (through Marinus or a predecessor?).

(5) Introduction of Acde into the Ptolemaic atlas. Elimination of the road system. The nomenclature remains chiefly Dacian.

(6) (Post-Ptolemaic). Introduction of Acde into the prototype of the Tabula Peutingeriana. About 25 new names, nearly all Latin. Only some three new Dacian names occur: Bersovia, *Cebonia, Arutela.[1] Bersovia, on the present Berzava, is already mentioned by Trajanus; the absence of the remaining two in pre-Ptolemaic literature may be accidental.

Evidently, the present edition of the Tabula was accomplished *after* the full victory of the Roman nationality.

g. *Examination of Details.*—In the following explanations of the single routes (p. 376), we make no attempt at using the road distances recorded by the Tabula Peutingeriana. As long as the genetic relations of Ptolemy's map and the Tabula are not exactly investigated, it seems hopeless to draw definite conclusions from the road measurements of

[1] Arutela is perhaps Latin=*Ara Tutelae, cf. C. Müller, I. p. 447. The barbarian-looking name Brucla on the Tab. Peut. is distorted=Brutia Anon. Ravenn., and of Latin origin.

Synopsis of Routes—General basis : The Danubian region.

I. 1. Tab. (Saldis), Arcidava, Azizis, Tivisco No. 1.
Ad Sallis, . . ., Aizizis, Tibiskon.

I. 2. Ad Sallis, Tibiskon, Zarmizegethusa, Zurobara, Singidava.
Ae Saldensioi, Tiriskon, Zermizirga, Ziridava, Sangidava.

I. 3. Tab. (Tivisco No. 2), (Acidava), ad Aquas, Germizera, . . . Apula, Salinis, Patavissa, Napoca, Cersie, Porolisso, ΔΔΔΔ.
Ae Saldensioi, Tiriskon, Argidava, *Aquae, Zermizirga, Ziridava, Apulon, Salinai, Patruissa, Napoka, Porolisson, ΔΔΔΔ, Karrodunon.

II. Tab. Tierua, Pretorio, *Agmonia (Anon.), Sarmategte.
Ad Dierna, Frateria, Akmonia, Zarmizegethusa.

III. Tab. Drubetis, Amutria, *Potula (Anon.), Rusidava.
Danube.
Ae Drubetis, Amutrion, Potula—, Zusidava.

IV. Tab. Rusidava, . . . Burridava, Pretorio , (S)acidava, Apula (→ I. 3.→ Cersie, ΔΔΔΔ).
Ae Zusidava, Piefigoi, Buridavensioi, Praitoria Augusta, Sangidava, Apulon (→ I. 3.→ ΔΔΔΔ, Karrodunon).
Ad (Zurobara), Biefoi, P(u)redavensioi, ..., Singidava, . . . (→ ΔΔΔΔ).
Ad Sukidava, ... Angustia, Zargidava, ... Karsidava, ΔΔΔΔ.

the latter authority. We have noticed above that names such as Tivisco No. 2 and A(r)cidava are on the Tabula assigned to wrong routes. Also Rusidava (Zusidava Ptol.) disturbs the order of stations, as we shall point out below, and Cersie and Porolisso seem to be exchanged. Such errors make the system of measurements too unsolid.

Route I.—Saldis in Pannonia inferior is the starting-point. Bersovia Tab. Peut. may be added to the sub-route I., 1 ; Trajanus went

Fig. 5.—Map of Dacia and Jazygia with the Ptolemaic names redistributed according to their presumed correct positions.

Names without brackets or in a single bracket ( ) are supposed to represent Ptolemy's prototypes Ac, Ad and Ae. Those within square brackets [ ] are names from the Tabula Peutingeriana ; those within double brackets (( )) are names from Ptolemy's map of Germania or from other sources.

from Berzovis to Aizis = Aizisis Ptol. (cf. Priscianus VI., 682, Auct. gr. Lat., ed. Putsch). Tibiskon seems to be Temesvár. Ad Aquas = Herkulesbäder. Zarmize-Gethusa or Sarmise-Gethusa on the river Sar(mati)-Getias, the present Sztrigi or Streiu ; the town was the capital of the Dacian king Decebalus, and is hence called "Royal" by Ptolemy. Ziridava, perhaps = Szerdahely. Apulon, Salinai, *Patavissa, Napoka, Porolisson represent a well-known Roman military and mer-

FIG. 6.—Presumed modern correspondences to the Ptolemaic Names from Dacia and Jazygia.

cantile road, leading to the Dukla defilé. Karrodunon (instead of Karsidava Ad) = Krosno, directly north of the defilé. A series of independent Dacian tribes follow: Biessoi, ibd., evidently near the present mountains called Bieskiden or Bezkydy; Piengitai, Sabokoi; Arsietai, fairly vis-à-vis the towns Arsikvia and Arsenion, in Ptolemy's "Germania" (Prot. B1). Then the Germanic tribe *Buriones (Burgiones Ptol.) vis-à-vis its duplicate in Ptolemy's Germania (Lugoi Buroi B1). Then again Dacian tribes: Anartofraktoi and Koistobokoi *transmontanoi; the latter are obviously contrasted with the Koistobokoi in Roman Dacia and possess the town Setidava in Ptolemy's Germania, north of Kalisia, *i.e.* north of the present Kalisz. Müllenhoff, Wietersheim-Dahn, and still Bremer *Ethnographie der germ. Stämme*, 2nd ed., 1905) reject the Ptolemaic localisation of the northern Koistobokoi, transplanting them to Hungary! There is no critical reason for this violent "emendation." The town Setidava proves the existence of Dacian nationality about the inferior Vistula. At Askaukalis, Route I. seems to have joined the mercantile road leading from Carnuntum on the middle Danube to the mouth of the Vistula. Askaukalis is the present Osielsk near Torn, according to v. Sadowski.

Route II.—The starting-point is the famous Iron Gate, where Trajanus built his military bridge, the Ptol. Zeugma. Dierna, the Latin Tierna or Tzerna, on the present river Cerna; Cerneti, may be a filial town (the Roman Trans-Tierna?). Arkinna = Arcan. Frateria = Fratesti in the Val Fratestilor; Ptolemy erroneously placed it south of Arkinna. The continued route passes Petroseni and Petrilla near the Vulcan defile; they seem to reflect Petris on the Tab. Peut., but this station here belongs to Route I. Terminal station: Zarmizegethusa, junction with Route I.

Route III.—Also here, the starting-point is at the Iron Gate. Drubetis is still mentioned in the Notitia Dignitatum, which date from about 400 A.D. Amutrion = Motru on the homonymous river. Potula = Potel on a homonymous lake. The route really ended at Romula, near the mouth of the Aluta, facing the present district of Romaniti. But Zusidava (= Sukidava Ad) is added as a far point of correspondence.

The Ptol. map contains between Potulatensioi and Sukidava the series Sornon, Tiason, Netidava, nowadays reflected by a series in reverse order: (4 Potel), 3 Soareni, 2 Teascul, 1 Nedeia on a homonymous lake. Perhaps they belong to Ad, representing individual additions to Route III. Prot. Ad seems to have represented this route in a confused manner, so that Paloda = Potula Ae was transplanted towards the mouth of the Danube. Pinon Ad = Pirum Ae is difficult to localise; perhaps Pires or Pirlita, both situated north-east of Bucuresti.

Route IV.—Sukidava Ad = Zusidava Ae is used as remote station of correspondence, as in Route III. The real starting-point is near the river Aluta, where Route III. ends. This fact appears from the Tab. Peut., where Ponte Aluti follows directly after Rusidava (= Zusidava Ae). The station Castra Trajana Tab. Peut. might be the present Troian north-east of the mouth of the Aluta. Only, we must then assume that the Tabula had placed it too far north. Buridav-Ae, per-

haps = Burda, near the homonymous river. After the garrison city Praitoria Augusta follows *Cebonie Tab. Peut. (MS. Cedonie = the present Cibin on the homonymous river). Sangidava, Anon. Ravenn. Sacidava, perhaps = Segesvár. Ibd. the tribe Kaukoensioi = the inhabitants of the Caucalandensis locus, Ammianus XXX., 4; C. Müller refers them to the river Kokel. Terminal station: Apulon, junction with Route I. Karsidava Ad may have been added as remote station of correspondence, like Saldis and Sukidava.

Finally, we may add an onomatic observation which may in certain cases be a means of ascertaining the continuation of classical names in Dacia. We have noticed that numerous Dacian towns are homonymous with rivers or lakes. The inclination for such "hydrographic" names has not been increased by the invading Slavs, for the Roman stations on the Moesian rivers Oescus, Utus, Asamus, Iatra, have all lost their potamic denominations. The Roumanians, however, preserved such names throughout, and therefore the occurrence of hydrographic denomination may assist us in tracing the remnants of the ancient Dacian nomenclature. We may register the cases known to us:—

(*a*) Towns named after rivers or lakes. Ptol.: Tibiskon, Dierna, Amutrion, Potula (river and lake), Netidava (lake), Partiskon: Tab. Peut.: Bersovia, *Cebonie.

(*b*) Rivers or valleys named after towns (cf. the river Ogost in Moesia, passing the town Augustae). Dio Cassius Sar(mati)-Getias, now Streiu, the river of Zarmize-Gethusa. Val Fratestilor near Fratesti = Frateria Ptol. Perhaps river Burdea near Burdea = Buridav-Ptol.

We hope that the above suggestions may interest scholars and contribute to the discussion of the attractive problem of ancient Dacian geography.

GEOGRAPHICAL NOTES.

EUROPE.

The Italian Earthquake of 1915.—Professor Robinson of Minnesota contributes to the May issue of the *Journal of Geography* some notes on a visit he paid to the Avezzano district in February last, with a view to studying the effects produced by the earthquake in January. The exceptional conditions have prevented the Press here, daily and scientific, supplying the full accounts which would have been available in peace time, so that these notes are of special interest. Professor Robinson found that in Avezzano, a town of about 16,500 inhabitants, only one building of more than one storey remained, and this was built of reinforced concrete. The one-storey houses were in better case; but in some instances, though the dwelling appeared intact externally, the interior had been wrecked by débris from the roof and

walls. This fearful destruction, with the resultant terrible loss of life, was largely the result of the mode of building. The houses were built for the most part of loose stones of different shapes and sizes, bound together only by poor mortar, and were without timber props. In consequence, the effect of the shock was to convert them into mere heaps of stone and sand, beneath which the inhabitants were buried. The majority of the victims were killed instantaneously. Both in Avezzano and the neighbouring villages Professor Robinson found that the work of excavation was taking place slowly, and in many cases the ruined houses will probably remain the tombs of the victims. At the time of his visit the scanty remnant of the population left alive was being well cared for in spite of great difficulties. All water had to be brought from a distance by rail, owing to the poisoning of the wells by the bodies of the dead. Wolves, apparently attracted by the disaster, had made their appearance, and three had been killed in the central park, where the relief organisation was situated. A remarkable fact was the comparative immunity from the effects of the shock enjoyed by the towns and villages on the hills as compared with those placed in the plain. Nearly all the settlements seriously affected were found to be in the region of lacustrine sands and clays, while hill villages near at hand were almost uninjured. The centre of the disturbance, it will be remembered, was the basin of the drained lake Fucino and its neighbourhood.

Africa.

Wheat in Egypt.—According to a note in the *Bulletin* of the Imperial Institute, wheat in Egypt occupies in an ordinary year about 17 per cent. of the total cultivated area, only maize (24 per cent.) and cotton (23·3 per cent.) occupying a larger total. Nevertheless the export of wheat is small, and more than counterbalanced by the imports. Thus in 1913 about 2400 tons were exported, mainly to Turkey, and 4600 tons were imported, chiefly from India. In addition, large quantities of wheat-flour were imported. In September 1914, on account of the anticipated reduction in the demand for cotton in the world's market, a decree was promulgated in Egypt that not more than 1,000,000 acres, or three-quarters of the area put down to the crop in 1914, were to be planted with cotton. The land thus set free was to be devoted to cereals, in the hope of rendering the country more independent of outside supplies, and of probably producing a surplus for export. Wheat is, of course, a winter crop in Egypt, and is grown in about equal amounts in Upper and Lower Egypt.

America.

Expedition to Alaska.—It is announced in *Science* that Dr. Robert F. Griggs, of the Department of Botany at the Ohio State University, has been selected by the National Geographic Society to lead an expedition to study the vegetation of the Katmai district in Alaska. The

purpose of the expedition is to study the means by which vegetation gains a foothold on the volcanic ash with which the country was covered by the eruption of Katmai in 1912. This ash-covered region is many hundreds of miles in extent, and covers a part of the Alaska Peninsula and the greater part of Kadiak Island.

The Volcanoes of the Lesser Antilles.—It is stated in *Nature* that Dr. E. O. Hovey, of the American Museum of Natural History, has just returned from a three months' expedition to Mont Pelée, the Soufrière, and the other volcanoes of the Lesser Antilles. He finds that the activity of Mont Pelée has steadily diminished since the great outbursts of 1902-3. On the east or windward side of the mountain vegetation has re-established itself up to the actual summit, and even the forest is beginning to reassert itself. The rocks of the new cone are more or less thickly coated with moss.

Death Valley, California.—Mr George D. Hubbard contributes to the *Journal of Geography* for May an interesting description of this valley, which must not be confused with the much smaller Death Gulch in Yellowstone Park. The latter is so-called owing to the fact that it fills up with carbon dioxide, but Death Valley in south-west California got its name from the death by thirst of a party of miners here in 1849. It is from 5 to 12 miles wide and 125 miles long, and has no outlet to the sea. No less than 500 square miles of its floor lie below sea-level, and the lowest point sinks to 285 feet below, making the region lie further below sea-level than any other part of America not covered by water. From the bounding mountain slopes springs issue, and the waters flow into the valley, to be lost in the sands of the floor. Some of these springs are of pure fresh water, others contain salt or borax, and some are warm. In addition to the springs a considerable stream enters the valley at its southern end, carrying brackish water. During the rainy season water often accumulates over the surface of the valley, forming an extensive temporary lake. When this water dries up the salt is evaporated, and the strong winds scatter sand, salt, and dust far and wide. The total rainfall of the area is small, with an average of 2½ inches per annum and a usual maximum of 5 inches. Vegetation is very sparse, and the summer temperature is high. The valley has practically no value for man. Borax is collected, and potash, which is known to occur, may some day be worked. Common salt is superabundant, but the conditions make its collection difficult.

Flax Cultivation in Canada.—A probable minor consequence of the world war is that it will tend to stimulate the production of new kinds of crops in the less developed regions of the world, for the cultivators in these will hope to be able to profit by the disturbed markets and enhanced prices to an extent sufficient to enable them to tide over the critical period at the beginning of a new industry. Among such possible new crops may be mentioned flax for fibre in Canada. According to the *Journal* of the Society of Arts a Flax Association has just been

started in that country, with the object of promoting the growth of the plant. At present a considerable acreage is laid down to flax each year in Canada, but this is for seed, not for fibre, the straw being simply burnt. In the west a large amount of land, believed to be very suitable for the plant, exists, especially along the line of the Canadian Northern, and attempts are to be made to grow the plant for fibre there.

Commercial Geography.

Railway Extension in Australia.—According to a note in the *Journal* of the Royal Society of Arts, Mr. Fisher, the Prime Minister of the Australian Commonwealth, has been bringing forward proposals for the direct connection by rail of the capitals of the different States, in place of the present circuitous routes, which are further mostly coastal lines, and thus liable to interruption in war time. At present a railway is being constructed between Kalgoorlie and Port Augusta, and it is proposed to continue this to the eastern towns by a cross-country connection. The new line would at first take advantage of the Murray valley, and then strike north-east between the Lauchlin and Darling rivers. The effect would be to link up Perth and Sydney by an almost straight line of rail, and the new route would greatly reduce the length of journey between the different capitals. A preliminary survey is being made for the line from Port Augusta to Brisbane along the inland route suggested above. The estimated cost of this line is £6,000,000.

General.

The Transport of Sediment by Streams.—In 1880 Mr. G. K. Gilbert published a monograph on the Geology of the Henry Mountains, which contained a full discussion of the work of rivers in modifying the surface of the land, a discussion whose results have been widely quoted since. Since that time its author has been desirous, he tells us, of obtaining, if possible, quantitative data in regard to the actual transporting work carried on by rivers. After a long period of waiting an opportunity for carrying on experimental work presented itself, and such work was carried on in a specially constructed laboratory in the University of California, Berkeley, during the period 1907-9. The results are published as "The Transportation of Débris by Running Water," which forms Professional Paper 86 of the U.S.A. Geological Survey. The primary purpose of the investigation was to discover the laws which control the movement of bed load, and especially to determine how the quantity of load is related to the slope of the stream, its discharge, and the degree of comminution of the débris. As a result of the experiments certain empirical formulae were deduced, but it was found that these cannot be applied directly to natural streams, owing to the complexity of the conditions prevailing there. The formulae may perhaps be used under some circumstances "to compare the work of one stream with that of another stream of the same type, but they do not permit an estimate of a river's capacity to be based on the determined

capacities of laboratory streams." Thus the primary purpose of the investigation was not accomplished. At the same time a number of interesting facts were obtained in regard to the transporting work of streams, and some of these may be noted here briefly.

Mr. Gilbert finds that the particles of the bed load move in various ways. Thus some slide, many roll, but the majority make short leaps, the process being called saltation. When the current becomes swifter the current leaps are extended, and if a particle thus freed from the bed be caught by an ascending portion of a swirling current its excursion may be indefinitely prolonged. It then becomes suspended, and thus saltation grades into suspension. In suspension the efficient factor is the upward component of motion in parts of a complex current. In saltation, rolling, and sliding the efficient factor is the motion parallel to the bed and close to it.

When the total bed load is small, the bed is moulded into hills, called by Mr. Gilbert dunes, which travel down stream. Their mode of advance is like that of eolian dunes, the current eroding their up-stream faces and depositing the eroded material on the down-stream faces. When progressive changes occur which tend to increase the load, the dunes disappear and the débris surface becomes smooth. The smooth phase is succeeded by a second rhythmic phase in which a system of hills tends to travel up stream. These are called anti-dunes, and their movement is accomplished by erosion on the down-stream face, and deposition on the up-stream face.

In regard to the effect of the load upon stream energy Mr. Gilbert says: "Load, including that carried in suspension and that dragged along the bed, affects the energy in three ways. (1) It adds its mass to the mass of the water, and increases the stock of energy *pro rata*. (2) Its transportation involves mechanical work, and that work is at the expense of the stream's energy. (3) Its presence restricts the mobility of the water, in effect increasing its viscosity, and thus consumes energy. For the finest elements of load the third factor is more important than the second; for coarser elements the second is the more important. For each element the second and third together exceed the first, so that the net result is a tax on the stream's energy. Each element of load, by drawing on the supply of energy, reduces velocity, and thus reduces capacity for all parts of the load."

EDUCATIONAL.

Summer Meeting in London.—A Summer Meeting is to be held at King's College, London, July 12 to 31, dealing with the war in its geographical, historical, and economic aspects, and is being organised by Professor Patrick Geddes and Dr. Gilbert Slater of Ruskin College, Oxford. Among those who are to take part we note the following:—Professor Geddes, Mr. H. J. Mackinder, M.P., Dr. R. W. Seton-Watson, etc. During the course of the meeting there will be a geographical and historical exhibition at King's College. Application

for further particulars should be made to the Secretaries, 21 Buckingham Street, Strand, W.C.

Summer Geographical Course at Aberystwyth.—A special course of geographical survey, nature study, and allied subjects will be held during the month of August next in the Aberystwyth University College, under the joint auspices of the Provisional Committee for the Development of Regional Survey and the Aberystwyth Department of Geography. Professor H. J. Fleure will give a course of lectures on the geography of western civilisation, and Mr. W. E. Whitehouse courses on map-reading, and on local climatic surveys. Applications should be made to the Registrar, University College, Aberystwyth.

NEW BOOKS.

EUROPE.

Progressive Portugal. By Ethel C. Hargrove. London: T. Werner Laurie, 1915. *Price* 6*s. net.*

Miss Hargrove was apparently a member of a party of journalists invited by the "Sociedade Propaganda de Portugal" to take a tour through that country. In her earlier chapters she describes the sights as seen by the ordinary tourist, while the rest of the book is devoted to various matters connected with Portugal—its modern music and art, and so forth. The book, which seems to be made up largely of articles contributed to periodicals, does not attempt anything but a superficial treatment of the questions discussed.

Old Calabria. By Norman Douglas. London: Martin Secker. *Price* 13*s. net.*

Old Calabria represents not only the modern Calabria but also Apulia, and therefore includes the promontory of Monte Gargano as well as the heel of the Italian boot. This is a country little explored by tourists, and yet it is of great interest, both historically and from the beauty of the scenery. Mr. Norman Douglas has written a most readable book, the result evidently of long residence in the country and an intimate acquaintance with the people. Readers of Dante and the Holy Roman Empire will find a new interest in tracing the haunts of the Hohenstaufens, Frederick II. and Manfred. Does not Villani in his Chronicle point out that Manfred was in Apulia when the Ghibelline refugees from Florence to Siena sent to him for succour in 1260, before the battle of Montaperti?

The most important chapter in some ways is that which deals with Malaria, for Old Calabria is the home of this pest. While Malaria is being dealt with in the north by means of drainage, here drainage is not of any use, owing to the formation of the soil. Fever here has greatly increased within the last two centuries, and to put it shortly, the main reason is denudation, due to the wholesale cutting down of timber. The mountain-slopes have been deprived of the forests which kept the hillsides intact, the result being that the torrential storms have swept down the soil and broken up the friable rock, carrying the detritus into the valleys where it forms a boggy swamp land, the best breeding-places for the mosquito. Mr. Douglas thinks there is no radical cure, and that the only means of keeping the fever in check is the free and constant use of quinine. We may hope that modern science will not rest until it has tackled a question so important for Italy.

The whole book is full of information, the result of much reading and close observation. It seems a pity that it should be marred by a spirit of rather cheap cynicism, and a wearisome tendency to be jocular, not always in the best of taste.

The Slav Nations. By Srgjan Pl. Tucić. English Translation by Fanny S. Copeland. London: Hodder and Stoughton, 1915. *Price* 1*s. net*

This is one of the *Daily Telegraph* war-books, and gives a very attractive account of the Slav peoples. It is divided into two sections, dealing respectively with the northern and southern groups. The latter part is of special interest at the present time, and the author's account of the relation between the administration of the dual monarchy and the southern Slav population, written as it is from a standpoint which has not hitherto found many exponents in this country, is noteworthy. The author includes the Bulgarians among the Slavs, while stating that they have in many ways always stood aloof from the "Slav ideal." In regard to the difficult and at present so much debated question of the size of the Italian elements in Istria and Dalmatia, Mr. Tucić is very emphatic. He gives the percentage of Italians in the former region as 4 per cent., and in the latter as 2 per cent., and states that the Austrian Government has deliberately favoured the Italian element as a means of further oppressing the Slavs, and thus tended to make the Italians aggressive, and inclined to set forward claims to which their numbers do not entitle them. Many of the questions discussed are of course highly controversial, but the book should be of value in helping to form opinion on the very difficult questions which will require to be solved in the North Adriatic at the close of the war. Further, the author's enthusiasm makes the volume exceedingly interesting reading, and the translator has done her work well.

The Balkan Cockpit: The Political and Military Story of the Balkan Wars in Macedonia. By W. H. Crawfurd Price. London: T. Werner Laurie, Ltd., 1915. *Price* 12*s.* 6*d. net.*

The fact that this story of the wars of 1912-13 has only now appeared has enabled the author to view the events in due perspective, which his personal participation in certain of them would have rendered difficult at the time. He gives a vivid account of the state of affairs in the Balkans preceding these conflicts, and reveals the hopelessly misguided policy of the Young Turks, which made many unfortunates sigh for a return to the days of Abdul Hamid. His information about the wars themselves, though later events have dwarfed their scale, enables the reader to gauge to some extent the present value of intervention by the Powers concerned. Mr. Price has a high opinion of the Bulgarian soldiery, though their record is a stained one, and he pays tribute to the distinguished scientific skill of the Greek Headquarters Staff. The illustrations and plans in the book are good.

A Short History of Belgium and Holland. By Alexander Young. London: T. Fisher Unwin, 1915. *Price* 5*s. net.*

The author informs us that by the researches of himself and others he is enabled to cast "new light on the character and career of William the Silent." For example, he denies the truth of the *sobriquet* so long given to the hero of the Netherlands, and declares that "so far from being the 'silent' man that he is commonly called, he had a pleasant flow of talk and a fund of humorous illustration which made his society very delightful." Again, William's dealings with

Don John of Austria and the Duke of Anjou, the means by which he obtained the great office of Ruward of Brabant, his relations with Ryhove and Inebize, the various attempts upon his life, the execution of his assassin, and the rewards to the assassin's family, are here exhibited in unfamiliar aspects. With regard to William's assassination, the author tells us that the house in Delft in which it occurred and where William resided, "is now used as a barrack," but the present writer found it in 1912 occupied as a museum illustrative of Dutch history and art. This volume contains seventy-seven illustrations, and will be found to be a useful companion to Motley's brilliant history.

AMERICA.

Mount M'Kinley and Mountain Climbers' Proofs. By Edwin Swift Balch. Philadelphia: Campion and Co., 1914.

In the glorious history of Arctic and Antarctic exploration, perhaps the most disagreeable and discreditable chapter is that relating to the unfortunate dispute over the first party to reach the North Pole. It is again unfortunate that the doubt and disputation which attached to the attainment of the North Pole should also exist in regard to the history of the conquest of the highest point of the North American Continent. This was claimed to have been gained on the summit of Mount M'Kinley by Dr. F. A. Cook with a single companion, Edward Barille, a packer, in September 1906. Dr. Cook's account of this ascent was generally accepted at the time. After the Polar dispute, however, and more especially after the Parker-Browne expedition of 1912 (*The Conquest of Mount M'Kinley*, 1913), it was asserted in many quarters in America that Dr. Cook's narrative was fraudulent, and that in reality he had not been within several or many thousand feet of the actual top of the mountain. The present volume is a comparative examination by Mr. E. S. Balch of the narratives of the four successful or almost successful expeditions to Mount M'Kinley hitherto made. He comes to the conclusion that all those accounts are in the main accurate, and therefore as Dr. Cook's expedition in 1906 was the earliest of these, to him belongs the honour of first having set foot on the "Top of the Continent." Most of the writers who have entered into the controversy have been wholly ignorant of mountaineering, and—usually—of snow work in general. Mr. Balch brings to the inquiry a profound literary and theoretical knowledge of mountain exploration, and has evidently had some practical acquaintance with snow-climbing in Switzerland in the early '80's of last century.

Contrary to the opinion now held by many people, Dr. Cook was by no means a beginner or amateur at snow work. He had been in both the Arctic and Antarctic regions, and had already, in 1903, been a member of a party which had reached 11,000 feet on the lower slopes of M'Kinley. Dr. Cook's literary style is somewhat unfortunate. The reviewer of his work in the *Alpine Club Journal* calls it "highly coloured"; the present writer would prefer "lurid," and considers it more suited to the pages of a "Yellow Press" journal than those of a permanent literary record of travel and adventure. We must remember, however, that Dr. Cook was not a mountaineer, nor, in fact, were any of the members of the four successful or almost successful parties. Mountaineering problems of perfectly simple and ordinary nature would present themselves to him in a most impressive guise. Hence his exaggerated and breathless language may be understood and excused.

A careful examination of the photographs taken by the four expeditions, and of their accounts, show that from a climber's point of view the ascent of Mount M'Kinley presents absolutely no difficulty whatever. The sole difficulties—and these are very great—are connected with transport, commissariat, and, of course,

cold and rarefied air. Technical mountaineering difficulties may be said to be almost non-existent. As Mr. Balch points out, Dr. Cook's account of the only part of the ascent giving anything approaching real climbing, that of the north-east arête, is fully confirmed by the description of the later parties who also followed this route. Dr. Cook describes this as "a smooth line of crested snow, with a sheer drop of about 4000 feet on either side." That is the non-climber's idea of a very ordinary corniced snow arête, as shown by the photographs, with angles on each side in the neighbourhood of 45°. Mr. Browne calls this "a steep but practicable snow slope."

The second party to make the ascent, said by some to have been only of the north and lower summit, walked up this ridge in one day, had no ice axes, and did not use a rope. This was the Lloyd party of Alaskan miners. The fourth party to make the ascent was that of the Rev. Hudson Stuck, of Yukon, in 1913. In his book called *The Ascent of Denali*, he states that the party wore "nothing else on their feet on the mountain except moccasins with ice creepers outside." That statement is quite enough to prove that the ascent was without mountaineering difficulty. There is one point against the reliability of Dr. Cook's account which has been called a somewhat strong one. He prints what purports to be a photograph of the top showing a considerable amount of rock. Mr. Belmore Browne publishes a photograph of the summit of a little peak near Denali which he calls "Fake Peak," and asserts was the peak really climbed by Dr. Cook. The present reviewer agrees with Mr. Balch that as regards "faking" it is Mr. Browne's photograph, not Dr. Cook's, which is "faked" in a photographic sense. Unfortunately the only independent photographs which exist of the actual summit are very bad double exposures of the Rev. Hudson Stuck's. These certainly show nothing in the least resembling Dr. Cook's view, and no rocks near the summit at all. Mr. Balch endeavours to explain this by pointing out the difference in the time of year of the ascents of Dr. Cook and the Rev. Hudson Stuck.

The Stuck ascent was made on 7th June, while Dr. Cook's was three months later in the year. Mr. Balch also says that Dr. Stuck's photograph from the summit does show rocks close at hand. This, however, is not the case, and is due to Mr. Balch's failure, probably from want of practical experience, to judge distances and proportion on high mountains, as shown by the usual short-focus lens of small snapshot cameras. In Dr. Stuck's photograph the rocks visible are almost certainly not less than a mile distant, and are very much lower than the point from which the photograph was taken. It is, nevertheless, possible that the evaporation —there cannot be any appreciable melting—during the three summer months may be great enough on the top of Denali to uncover some of the underlying rocks.

Neither Dr. Cook's nor Mr. Belmore Brown's photographs are in any case proof of anything at all, as neither shows any distant and recognisable view. They merely show a man with a flag standing on a rock on a snow ridge. There would not be the slightest difficulty in taking a precisely similar view on any Alpine ridge, or, for that matter, in Scotland in spring.

The present reviewer considers that though Mr. Balch cannot be said to have proved the authenticity of Dr. Cook's claim to have first reached the top of the North American Continent, yet he has shown that a great part of the abuse of Dr. Cook was undeserved. There seems nothing inherently impossible in the story. The point thought to be made by Dr. Cook's opponents regarding what they consider his incredibly fast pace is of slight value. Dr. Cook gives his loads, equipment, and provisions in full detail. These are well thought out and eminently practical. He had no huge piles of impedimenta to convey, as the other, and therefore slower, parties had—an enormous advantage. Then there were only two in his party.

On the whole, the present reviewer considers that the balance of probability is in favour of Dr. Cook. His book has been prejudiced to British tastes by the frantic and screaming language printed under the photographic illustrations, and the preposterous drawing of the "Sidehill Ditch" is both bad art and ridiculously impossible as a record of fact. Nevertheless the record of his work is of a heroic effort or feat, carried out with brains and pluck through immense toil, suffering, and endurance, and it is hard to think that such a man is a conscious faker or fraud. H. R.

Forty Years in Canada. By Major-General S. B. Steele, C.B., M.V.O. London: Herbert Jenkins, Ltd., 1915. *Price* 16*s. net.*

Major-General Steele's book is mainly made up of his reminiscences of life in the north-west of Canada, where he served for many years with that splendid force the North-West Mounted Police. He first saw active service as a participant in the Red River Expedition of 1870, which, under the leadership of Viscount (then Colonel) Wolseley, was the means of putting down the rebellion of the French Métis, headed by Louis Riel. It will be recalled that the expedition had to make its way through the wilderness to the then far remote Fort Garry and Winnipeg. Major-General Steele recounts how the men had to drag their boats and stores through rapids and over difficult portages, officers and men performing prodigies of work. Winnipeg was then but a hamlet and a frontier station of the Hudson's Bay Company. A much easier road was at hand through United States territory, but the exigencies of the time required that the expedition should take the route which it followed through the wilds, and the author gives an interesting account of his experiences. Some years later, when the building of the Canadian Pacific Railway was commenced, we find Major-General Steele as an officer of the North-West Mounted Police, and he had much to do with maintaining order at a time when Indian raids were frequent, and when an unruly element was present, in the shape of the keepers of drinking-saloons and gambling-dens, who followed close on the track of the workers of many nations required for the building of the railway. The author has much to tell of his work in inspiring respect for the law in "the wild and woolly west." How he and the fine body of men he had working with him succeeded in doing this is well told in his book. Nor was there lacking a pleasanter side of life, in the shape of junketings and entertainments among the settlers, all of which is recounted at some length. If anything, the book is a little overladen with details of the proceedings in which the author took a part, but this may be an added merit for readers who have personal associations with the country and the times referred to.

We next find the author in command of the mounted police, and doing yeoman service in the Klondyke during the first two years of the rush to the new goldfields. How successful the Dominion authorities were in checking the rowdy element and preserving law and order is now a matter of history, and much of that success was apparently due to the indomitable energy and resource displayed by Major-General Steele. This was recognised by his chiefs, and, on the outbreak of the South African War, he got command of the fine regiment of horse raised by Lord Strathcona in Canada, and called by his name. Two periods of service in South Africa—the first in command of the above cavalry regiment, and the second given to the organisation of the police, bring this volume to a close. The entire record is one of strenuous service, faithfully performed, often under conditions of great difficulty; and the author, if he says much of his own share in the work, is not niggardly in the praise which he bestows alike on his colleagues and his subordinates. The book is full of adventures by flood and field, and we be-

lieve it will be especially welcomed by all who are interested in the wonderful story of the transformation of the Canadian North-West from the wilderness of forty odd years ago to its present condition of peaceful prosperity.

AUSTRALASIA.

Five Years under the Southern Cross: Experiences and Impressions. By FREDERIC C. SPURR. London: Cassell and Co., 1915. *Price* 6*s. net.*

Mr. Spurr is a Baptist minister who spent five years in Australia, and during that time contributed to the *Christian World* a number of articles on the country. These brought him, he says, a great deal of correspondence, and aroused so much interest as to show that relatively little is known, even among well-educated people, of life in Australia. The present book is, we take it, largely based upon these articles, and the most vivid impression which it will produce upon the geographer is regret that it should remain true that the facts herein mentioned are not already fully known to "well-educated people at home." It shows how much spade-work remains necessary in popularising geography, for the really admirable handbooks and publications which the various states and government departments in Australia have produced, to say nothing of several excellent geographies of the country which have appeared recently, show that if there is ignorance of the country it is not that material is not available, material which is arranged in a manner which is at once scientific and popular. We may mention especially Mr. Gullett's *The Opportunity in Australia*, reviewed here in vol. xxx., p. 635, as treating fully, and from the point of view of a professional, matters only touched on by Mr. Spurr. The latter author's book will, however, no doubt find its public among those who only want a general description of life in Australia.

BOOKS RECEIVED.

Germany and Eastern Europe. By LEWIS B. NAMIER, B.A. With an Introduction by H. A. L. FISHER. Crown 8vo. Pp. xvi + 127. *Price* 1*s. net.* London: Duckworth and Co., 1915.

The Wonderland of Egypt. By PERCY R. SALMON, F.R.P.S. Demy 8vo. Pp. 320. *Price* 2*s.* 6*d. net.* London: Religious Tract Society, 1915.

The Logbooks of the "Lady Nelson": The Journal of her First Commander, Lieutenant James Grant, R.N. By IDA LEE, F.R.G.S. (Mrs. C. H. Marriott). Demy 8vo. Pp. xx + 328. *Price* 10*s.* 6*d. net.* London: Grafton and Co., 1915.

Et Primitivt Folk: De Mongolske Ren-nomader. By ØRJAN OLSEN. Demy 8vo. Pp. iv + 156. Kristiania: J. W. Cappelens Forlag, 1915.

The New Russia: From the White Sea to the Siberian Steppe. By ALAN LETHBRIDGE. Demy 8vo. Pp. xv + 314. *Price* 16*s. net.* London: Mills and Boon, Ltd., 1915.

The Soul of Germany: A Twelve Years' Study of the People from Within, 1902-14. By THOMAS F. A. SMITH, Ph.D. Crown 8vo. Pp. xv + 351. *Price* 6*s. net.* London: Hutchinson and Co., 1915.

The Agony of Belgium: Being Phase I. of the Great War. By FRANK FOX. With a Map. Crown 8vo. Pp. 317 + 32. *Price* 6*s. net.* London: Hutchinson and Co., 1915.

Mountain Exploration in Alaska. By ALFRED H. BROOKS. Royal 4to. Pp. 22. Philadelphia: American Alpine Club, 1914.

Brazil (1913). By J. C. Oakenfull. Crown 8vo. Pp. viii + 626. *Price* 7*s.* 6*d. net.* London: Brazilian Legation, 1915.

Poland and the Polish Question: Impressions and Afterthoughts. By Ninian Hill. With Illustrations and a Map. Demy 8vo. Pp. 340. *Price* 10*s.* 6*d.* London: George Allen and Unwin, Ltd., 1915.

Black's Travel Pictures: North America and the West Indies and Australasia. Selected and Edited by Robert J. Finch, F.R.G.S. Large 8vo. Pp. 24. *Price* 10*d. each.* London: A. and C. Black, Ltd., 1915.

Modern Germany and Her Historians. By Professor Antonine Guilland. Demy 8vo. Pp. 360. *Price* 7*s.* 6*d. net.* London: Jarrold and Sons, 1915.

The War and the Balkans. By Noel Buxton, M.P., and Charles Roden Buxton. Crown 8vo. Pp. iv + 112. *Price* 2*s.* 6*d. net.* London: George Allen and Unwin, Ltd., 1915.

La Guerra Mondiale (*Suoi Fattori Geografici e Storici*). By Professor Giuseppe Ricchieri. Post 8vo. Pp. 176 + xi. *Price L.*1.50. Milano: Fed. Italiana Delle Bib. Pop., 1915.

Questions and Exercises on Mackinder's Elementary Studies in Geography: Our Own Islands, Distant Lands, and Lands Beyond the Channel. By E. G. R. Taylor, B.Sc. Crown 8vo. Pp. 31, 28, 28. *Price* 3*d. each.* London: George Philip and Son, Ltd., 1915.

The Economics of War and Conquest. By J. H. Jones, M.A. Crown 8vo. Pp. xviii + 160. *Price* 2*s.* 6*d. net.* London: P. S. King and Son, Ltd., 1915.

The Two Maps of Europe, and Some Other Aspects of the Great War. By Hilaire Belloc. Crown 8vo. Pp. 128. *Price* 1*s. net.* London: C. Arthur Pearson, Ltd., 1915.

The Statesman's Year-Book. Statistical and Historical Annual of the States of the World for the Year 1915. Edited by J. Scott Keltie, LL.D. Assisted by M. Epstein, M.A., Ph.D. Crown 8vo. Pp. lxxxiv + 1535. *Price* 10*s.* 6*d. net.* London: Macmillan and Co., Ltd., 1915.

Educative Geography: A Note-Book for Teachers. By John L. Haddon, B.Sc.(Lond.). Crown 8vo. Pp. 76. *Price* 1*s. net.* London: G. W. Bacon and Co., Ltd., 1915.

Staffordshire. (Cambridge County Geographies.) By W. Bernard Smith, B.Sc. Crown 8vo. Pp. xii + 155. *Price* 1*s.* 6*d. net.* Cambridge: University Press, 1915.

Commercial Geography: An Intermediate Text-Book. By Alex. L. Curr, B.A.(Lond.). Crown 8vo. Pp. viii + 440. *Price* 3*s.* 6*d.* London: A. and C. Black, Ltd., 1915.

A List of Geographical Atlases. Vol. III. Washington: Library of Congress, 1914.

Colonial Reports (*Miscellaneous*).—St. Vincent (90). London, 1915.

Colonial Reports (*Annual*).—Somaliland (837). London, 1915.

Diplomatic and Consular Reports.—Trade of Galveston (5434). Milan (5438). German East Africa (5441). Saigon (5442). New Orleans (5443). Algeria (5444). London, 1915.

Dagh Register gehouden int Castel Batavia. Annos 1661, 1663, and 1680. Batavia: Office of the State Archives.

De economische en financielle toestand Der Kolonie Surinane (56). Gravenhage, 1911.

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THE SCOTTISH

GEOGRAPHICAL

MAGAZINE.

LAND FORMS AND LANDSCAPES.[1]

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(*With Illustrations.*)

V. Specific Land Forms.

Before any attempt can be made at the investigation of specific forms, it is necessary to offer some precise definition of the term "land form." Any definition of a land form as a closed or partially closed geometrical figure is beset with many difficulties. It is therefore suggested that the ideal land form should be defined as any surface or slope which has been produced by the activity of a single force. In reality, however, such monodynamic surfaces are rare. More commonly various forces act simultaneously or in succession in producing a given surface, and in such cases, which may be termed polydynamic, the surface or slope may be assigned (1) to the predominant force when several forces have acted simultaneously, or (2) to the proximate force when several forces have acted in succession. In the latter case an exception may be allowed when it can be clearly established that the present surface of a polydynamic form is parallel with the surface produced by an earlier or original force, and may therefore, in accordance with the Law of Slopes, be claimed as the product of that earlier or original force.

When a surface feature is enclosed (1) by one continuous surface, or (2) by two or more surfaces meeting in edges, the definition of a land form given above may be extended to include such features, provided (1) that all parts of the continuous surface enclosing the feature may be referred to the activity of one and the same force, or (2) that

[1] Continued from p. 253.

the various surfaces which meet in edges are simply repetitions of the same form. On the other hand, when a feature is formed or enclosed by a surface or surfaces portions or all of which have been produced by different forces, such a feature, in place of being a land form, is really a landscape form or a combination of different specific land forms. These suggestions are applied in the following analysis of land forms :—

ORDER. ENDOGENETIC NEGATIVE LAND FORMS.

Family 1. Forms due to superficial volcanic activity.
- Genus a. Effusion Forms.
  - Sub-genus 1. Flexure Forms.
    - Sp. F.[1] Slopes of hollows and depressions arising through effusion of lava. By extension the hollows and depressions themselves.
  - Sub-genus 2. Fracture Forms.
    - Sp. F. Fault scarps arising through effusion of lava.
- Genus b. Explosion Forms.
  - Sub-genus 1. Flexure Forms.
    - Sp. F. Slopes of hollows and depressions formed by or after volcanic explosions.
  - Sub-genus 2. Fracture Forms.
    - Sp. F. Crater walls and slopes of rifts formed by volcanic explosions. By extension the pipes and rifts themselves.

Family 2. Forms due to sub-crustal volcanic activity.
- Genus a. Flexure Forms.
  - Sp. F. Slopes of hollows and depressions formed by sub-crustal transference of igneous material.
- Genus b. Fracture Forms.
  - Sp. F. Fault scarps due to sub-crustal transference of igneous material, *e.g.* walls of calderas.

Family 3. Forms due to radial movements.
- Genus a. Flexure Forms.
  - Sp. F. Concave slopes of surfaces warped and flexured by unequal vertical movements. By extension the shallow hollows, synclinals and depressions thus formed.
- Genus b. Fracture Forms.
  - Sp. F. Scarps of normal faults.

Family 4. Forms due to tangential movements.
- Genus a. Flexure Forms.
  - Sub-genus 1. Simple Flexure Forms.
    - Sp. F. Concave slopes of surfaces warped and flexured under compressional strain. By extension the hollows and depressions thus formed.
  - Sub-genus 2. Complex Flexure or Fold Forms.
    - Sp. F. Concave slopes of steeply folded and buckled surfaces. By extension the hollows, furrows, and depressions thus formed.
- Genus b. Fracture Forms.
  - Sp. F. Walls of rifts formed under tensional strain or upon relief of compressional strain. By extension the rifts themselves.

[1] Sp. F.=Specific Forms.

ORDER. ENDOGENETIC POSITIVE LAND FORMS.

Family 1. Forms due to superficial volcanic activity.
Genus a. Effusion Forms.
Sub-genus 1. Solidification Forms.
Sp. F. Lava plains, slopes, scarps, etc. By extension lava cones, domes, and flows.
Sub-genus 2. Precipitation Forms.
Sp. F. Sinter plains, slopes, scarps, etc. By extension sinter cones, terraces, and basins.
Genus b. Explosion Forms.
Sp. F. Plains and slopes of ash and agglomerate. By extension ash-fields and cones.
Family 2. Forms due to sub-crustal volcanic activity.
Genus a. Flexure Forms.
Sp. F. Slopes and portions of slopes of elevations determined by sub-surface injection of igneous material.
Genus b. Fracture Forms.
Sp. F. Scarps of reversed faults due to sub-surface injection of igneous material.
Family 3. Forms due to radial movements.
Genus a. Flexure Forms.
Sp. F. Convex slopes of surfaces warped and flexured by unequal vertical movements. By extension the low anticlinals and domes thus formed.
Genus b. Fracture Forms.
Sp. F. Scarps of upthrow faults.
Genus c. Disruption Forms.[1]
Sp. F. Surfaces of rock-falls, landslips, sand and mud flows and cones formed during vertical adjustments. By extension the rock-falls and mud cones themselves.
Family 4. Forms due to tangential movements.
Genus a. Flexure Forms.
Sub-genus a. Simple Flexure Forms.
Sp. F. Convex slopes of surfaces warped and flexured under compressional strain. By extension the low anticlinals and domes thus formed.
Sub-genus b. Complex Flexure or Fold Forms.
Sp. F. Convex slopes of steeply folded and buckled surfaces. By extension the arches and anticlinals thus formed.
Genus b. Fracture Forms.
Sp. F. Scarps of reversed faults.

ORDER. EXOGENETIC DEGRADATION LAND FORMS.

Family 1. Degradation Forms due to the action of the run-off.
Genus a. Sheet Corrasion Forms.
Sp. F. Slopes and summits covered with sedentary soil except where included under Family 2, Genus a. Also slopes bounding water channels in transported soils, clay rocks, glacial débris, etc.,

[1] Or Displacement Forms.

and other slopes when clearly modified since accumulation of the material. By extension earth pyramids, ridges, and mounts of bad lands.

Genus b. Sheet Solution Forms.

Sp. F. Bare surfaces of limestone and other soluble rocks. By extension ridges, mounts, pinnacles, and joint-rifts of karrenfelder.

Family 2. Degradation Forms due to the action of percolating water.

Genus a. Chemical Disintegration Forms.

Sp. F. All surfaces of bare rock disintegrating under wet weathering. Also surfaces covered with sedentary soil, in accordance with the Law of Slopes. By extension relic blocks, tors, knobs, pinnacles, ridges, and mounts of bare rock undergoing chemical disintegration. Many fault line and other scarps arising through differential decay may be included here. On the other hand, bare and soil-covered slopes retaining the forms imparted by ice or sea may be classified as polydynamic under Families 8 and 9.

Genus b. Solution Forms.

Sp. F. Soil-covered walls of hollows, sinks, and swallow hole in limestone : pits and caldrons in granite and other rocks containing standing water. By extension the hollows and caldrons themselves. Limestone caverns and precipices bounding natural arches, collapsed caverns, etc., may be included as polydynamic forms.

Genus c. Corrasion Forms.

Sp. F. Scarred surfaces produced by rock-falls, landslips, clay flows, etc.

Family 3. Degradation Forms due to the action of streams and rivers.

Genus a. Line Corrasion Forms.

Sp. F. River beds, stream channels, corrasion flats and terraces, furrows, pot-holes, caldrons, undercut cliffs, walls of gorges. All precipices and slopes, *e.g.* river banks, scarps of waterfalls, and steep valley slopes, due mainly to undercutting and collapse, may be included here as polydynamic forms.

Genus b. Line Solution Forms.

Sp. F. Walls and floors of stream channels in limestone rocks, ice sheets, etc.

Family 4. Degradation Forms due to the action of life.

Genus a. Diffission Forms.

Sp. F. Quarry scarps and fractured surfaces of rocks and boulders split by men or plants.

Genus b. Excavation Forms.

Sp. F. Holes and caves excavated by men or animals. Also hollows and forms resulting from their collapse.

Family 5. Degradation Forms due to the action of lightning.

Genus a. Diffission Forms.

Sp. F. Fractured surfaces of blocks and rocks split by lightning. By extension the rifts and broken blocks themselves.

Genus b. Fusion Forms.

Sp. F. Fulgurites in rock and sand.

Family 6. Degradation Forms due to the action of sun-heat.

Genus a. Physical Disintegration Forms.

Sp. F. Surfaces of bare rock disintegrating under the influence of temperature changes. By extension relic blocks, tors, knobs, ridges, mounts, needles of bare rock.

Genus b. Diffission Forms.

Sp. F. Fractured and exfoliating surfaces. By extension the split blocks and exfoliating domes and cones themselves.

Genus c. Liquefaction Forms.

Sp. F. Solution surfaces of glaciers and ice sheets. By extension ridges, pinnacles, glacier tables, etc.

Family 7. Degradation Forms due to the action of the atmosphere.

Genus a. Sheet Corrasion Forms.

Sp. F. All wind-worn, fretted, and faceted surfaces of rocks, boulders, undercut cliffs, etc. By extension mesas, buttes, etc., with wind-worn surfaces. Also slopes of wind-worn hollows and depressions in sand and clay, and by extension the hollows (pans) themselves.

From G. J., xxxv., 1910.

FIG. 18.—A Barchan on the Kharga road, Egypt.

Genus b. Chemical Disintegration Forms.

Sp. F. Pocket-holes and vesicles in granite and other rocks due to dry weathering.

Family 8. Degradation Forms due to the action or presence of frozen water.

Genus a. Diffission Forms.

Sp. F. Frost-riven scarps and slopes of bare rock. Also fractured surfaces of glacier crevasses, etc., and by extension the crevasses themselves.

Genus b. Corrasion Forms.

Sp. F. Ice-worn and grooved surfaces of bare rock. By extension ice-worn knobs, domes, ridges, etc., of bare rock or soil-covered in accordance with the Law of Slopes.

Family 9. Degradation Forms due to the action of the sea.

Genus a. Corrasion Forms.

Sp. F. Wave-cut platforms and terraces, undercut cliffs, and precipices formed mainly by undercutting and collapse. Also walls of wave-cut chasms, arches, caves, etc., and by extension the chasms, arches, and caves themselves.

Genus b. Diffission Forms.

Sp. F. Precipices, hollows, and caverns, due mainly to the plucking action of the waves.

ORDER. EXOGENETIC AGGRADATION LAND FORMS.

Family 1. Aggradation Forms due to the action of the run-off.
Genus a. Sheet Alluvial Forms.
Sp. F. Surface slopes of accumulations of rain-wash, and of sheets and platforms of rain-transported soil. By extension rain-wash terraces.
Family 2. Aggradation Forms due to the action of percolating water.
Genus a. Dislocation Forms.[1]

Photo by H.M. Geological Survey of Scotland.

FIG. 19.—Drumadoon Sill, Arran.

Sp. F. Slopes of rock-falls and barriers, clay flows, rock glaciers, landslips, mud lavas, soil creep terraces, etc. By extension the rock-falls and landslips themselves.
Genus b. Precipitation Forms.
Sp. F. Slopes and surfaces of sinter deposits, calcareous and ferruginous incrustations, etc. By extension stalactites, stalagmites, etc.
Family 3. Aggradation Forms due to the action of streams and rivers.
Genus a. Torrential Forms.
Sp. F. Slopes of fans, cones, banks, and benches of coarse débris. By extension the fans and benches themselves.
Genus b. Alluvial Forms.
Sp. F. Slopes of cones, banks, levees, terraces, flats, and deltas of sand and clay. By extension the cones and deltas themselves. Also fluvio-glacial flats, mounds, eskers, etc., may be included here as polydynamic forms.
Genus c. Dislocation Forms.[2]

[1] Or Displacement Forms. [2] *Ibid.*

Sp. F. Surfaces of rock-falls and landslips due to undercutting of banks. By extension the landslips themselves.

Family 4. Aggradation Forms due to the action of life.

Genus a. Aggregation Forms.

Sp. F. Surfaces and slopes of quaking bogs, beaverdams, ant-heaps, walls, houses, etc. By extension the ant-heaps, houses, etc., themselves.

Genus b. Dislocation Forms.[1]

Sp. F. Surfaces of rock-falls and landslips due to burrowing of animals or excavations of men. By extension the rock-falls themselves.

Family 5. Aggradation Forms due to the action of lightning.

Genus a. Dislocation Forms.[2]

Sp. F. Rock-falls arising through fracture by lightning.

Family 6. Aggradation Forms due to the action of sun-heat.

Genus a. Dislocation Forms.[3]

Sp. F. Talus slopes of coarse or fine angular débris.

Genus b. Evaporation Forms.

Sp. F. Surfaces of lake deposits and incrustations on rocks.

Family 7. Aggradation Forms due to the action of the atmosphere.

Genus a. Æolian or Wind Aggregation Forms.

Sp. F. Slopes and surfaces of sand dunes, banks, fields, snow-drifts, etc. By extension the dunes and banks themselves.

Genus b. Precipitation Forms.

Sp. F. Protective crusts, desert varnish, etc., formed by inter-action of wind-carried and local material.

Family 8. Aggradation Forms due to the action or presence of frozen water.

Genus a. Snow Forms.

Sp. F. Precipitation surfaces of snow banks, fields, etc. By extension snow banks and fields themselves.

Genus b. Ice Forms.

Sp. F. Surfaces of lake, river, and beach ice. Ice plains, terraces, hummocks, etc. Also surfaces of glacier ice determined by ice-flow. By extension glaciers themselves.

Genus c. Dislocation Forms.[4]

Sp. F. Screes or talus slopes of angular debris.

Genus d. Moraine Forms.

Sp. F. Slopes of terraces, benches, mounds, hollows, crescents, etc., of lateral, terminal, and bottom moraines. By extension the mounds, crescents, drumlins, etc., themselves.

Genus e. Glacieluvial Forms.

Sp. F. Slopes of terraces, mounds, kames, etc., formed of glacial wash. By extension the mounds and kames themselves.

Family 9. Aggradation Forms due to the action of the sea.

Genus a. Storm Beach Forms.

Sp. F. Slopes of boulder and shingle beaches, bars, and spits. By extension the beaches and bars themselves.

Genus b. Marine Alluvial Forms.

Sp. F. Slopes and surfaces of sand beaches, banks, bars, spits, mud-

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[1] Or Displacement Forms. [2] *Ibid.* [3] *Ibid.* [4] *Ibid.*

banks and flats. By extension the sand-banks and mud-flats themselves.

Genus c. Dislocation Forms.[1]

Sp. F. Surfaces of rock-falls and landslips due to undercutting by the sea. By extension the rock-falls and landslips themselves.

VI. Landscapes.

Upon the preceding discussion and classification of land forms we may now base a brief consideration of landscapes. The word "landscape" appears to have been first applied to a picture or painting repre-

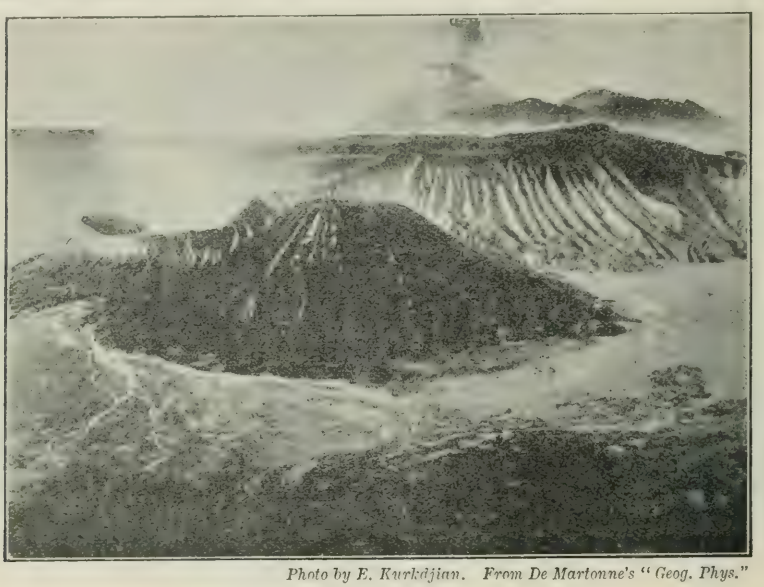

Photo by E. Kurkdjian. From De Martonne's "Geog. Phys."

Fig. 20.—Recent volcanic cones, Java.

senting an expanse of country, a representation of the scenery as observed in one particular direction, as distinguished from a panorama, a picture, or representation of scenery as seen in all directions from a central point. The word "landscape," however, may also be used of the actual view or prospect which opens out before the eyes in any particular direction. It is obvious that a view may be less or more extensive according to the altitude of the observer and the character of the surface. The higher the view-point, the greater as a rule is the extent of country which may be seen: the more irregular or rugged the country, the less extensive is the view except from specially selected points. A primary distinction might therefore be drawn between a narrow or confined and a wide or extensive view or landscape. An extensive landscape, or a view from a point commanding a great extent of country, may introduce regional

[1] Or Displacement Forms.

and structural considerations which are more generally absent in the case of a confined view or landscape. Wide or extensive landscapes are also the more complex in the sense that they are made up of a greater number of land forms than confined views or landscapes. For these two reasons the confined view or landscape may be considered the more elementary in type.

In order, however, to give our definitions more scientific precision, we may suggest that when a view or the representation of a view of any portion of the surface exhibits a definite and easily recognised [1] combination of not less than two different specific land forms, such a view should be termed a "landscape form." For example, a view of a granite dome with a uniformly curved surface or of an endogenetic fault scarp does not in itself constitute a landscape form, but it becomes a landscape form if, along with the dome or fault scarp, there be introduced into the view some other land form, such as a portion of the surface of the plain from which the dome rises or a stream-cut gorge trenching the face of the fault scarp. Obviously, a landscape form in this sense may be made up of a combination of two or more endogenetic land forms of the same or different genera, of two or more exogenetic land forms of the same or different genera, or of two or more endogenetic and exogenetic land forms together. In many cases it will be found that a landscape form is dominated by one particular land form of the combination which determines the landscape form. Such landscape forms may be termed "simple" landscape forms, and classified according to the predominant or striking land form within the combination, and with the substitution of "Landscape Form" for "Form" or "Land Form," the classification already given for land forms may be adopted for simple landscape forms, the specific landscape forms being designated by the names of the predominant land form. For example, Fig. 18, in which a barchan is the predominant form, is a specific example of a simple dune landscape form, and may be classified as a simple exogenetic aggradation landscape form due to wind aggregation. Again, Fig. 17,[2] p. 252, in which the storm beach is the striking form, is a specific example of a simple storm-beach landscape form which may be classified as an exogenetic aggradation landscape form due to the violent action of the sea. Fig. 9, p. 149, in which the predominant or striking land form is the rift line, may also be regarded as a simple rift-line landscape form, and classified as an endogenetic negative tangential fracture landscape form.

It frequently happens that of two land forms in a landscape form it is difficult to decide which is predominant. Both may be necessary to complete the landscape form. Such landscape forms may be termed "composite," described in terms of both the predominant forms, and classified as *endogenetic* landscape forms when both forms are endogenetic, as *exogenetic* landscape forms when both forms are exogenetic, and as *endo-exogenetic* landscape forms when one form is endogenetic and the other exogenetic. The specific composite landscape forms may also

[1] *i.e.* easily recognised from the position of the observer.

[2] Neglecting the background.

be designated by names which sufficiently define their character, *e.g.* cliff and talus landscape form, scarp and dip slope landscape form, river bank and plain landscape form, etc. Fig. 19, for example, is a composite exogenetic cliff and talus landscape form, made up of a combination of two predominant forms, namely, an exogenetic degradation ice diffission form (the cliff), and an exogenetic aggradation ice displacement form (the talus).

We may now attempt to discriminate between a landscape form and a landscape proper. A landscape proper, or briefly a landscape, may be defined as a view composed of two or more, and generally of a large number of landscape forms. Exceptionally, a landscape may be made up of a number of different specific landscape forms, but more frequently

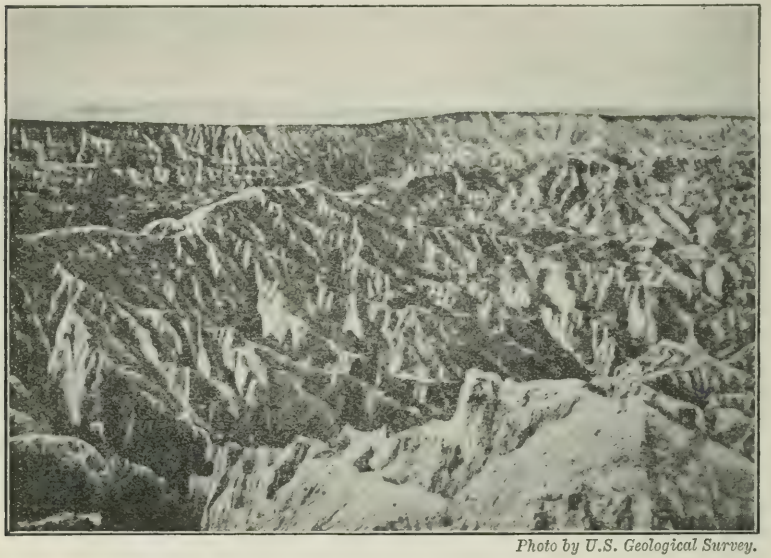

Photo by U.S. Geological Survey.

Fig. 21.—Bad Lands of Dakota.

landscapes are composed of a more or less orderly repetition of certain landscape forms. It may happen that a single repetitive landscape form dominates the landscape, and such landscapes may then be termed "simple" landscapes, and classified according to the classification of the respective dominant landscape form. For example, Fig. 20, a landscape dominated by the volcanic cone as the repetitive landscape form, would be classified as an endogenetic positive landscape due to superficial explosive volcanic activity. Similarly, a landscape dominated by the sand dune as the repetitive landscape form, would be classified as an exogenetic aggradation landscape due to aggregation of material by the wind. More generally, however, it happens that a landscape is dominated by or exhibits the predominant repetition of more than one landscape form, and these landscape forms may be both or all endogenetic positive landscape forms, endogenetic negative landscape forms, exogenetic aggra-

dation landscape forms, exogenetic degradation landscape forms, or some combination of endogenetic and exogenetic landscape forms. Such landscapes may be termed "composite," described in terms of the constituent repetitive landscape forms, and classified as composite endogenetic landscapes when all the predominant landscape forms are endogenetic, as composite exogenetic landscapes when all the predominant landscape forms are exogenetic, or as composite endo-exogenetic landscapes when the predominant landscape forms are partly endogenetic and partly exogenetic. It is convenient to use qualifying terms to indicate the specific types of landscape, *e.g.* mountain landscape, valley landscape, plateau landscape, plain landscape, inselberg landscape, block and basin landscape, ridge and furrow landscape, scarp and vale landscape,[1] etc. Further,

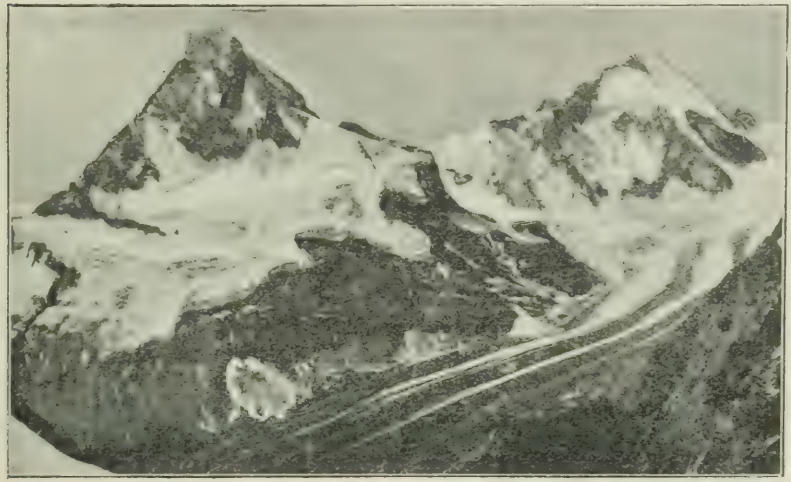

Photo by Vittorio Sella. From De Martonne's "Geog. Phys."

FIG. 22.—The Matterhorn and the Dent d'Hérens.

composite exogenetic landscapes frequently show the repetitive landscape forms arranged in parallel series or zones, and such landscapes may be conveniently termed "belted" landscapes as distinguished from those landscapes in which the repetitive landscape forms are irregularly intermingled.

Fig. 1, p. 60, is a village landscape which may be classified as a specific example of a simple exogenetic landscape characterised by the repetition of human aggregation landscape forms. Figs. 2 and 3, pp. 61, 62, are coastal landscapes and specific examples of simple exogenetic landscapes characterised by the repetition of a composite sea-cliff and

[1] This use of the popular terms mountain, valley, lake, etc., as more or less arbitrary designations of specific landscapes, appears to the writer to be the only justifiable use of these terms in modern scientific geography. Their continued use in modern text-books as names of classes or orders of land forms is much to be deprecated. See also p. 144, line 34, and p. 246, line 3. The discussion of coastlines, as given in many text-books, forms no part of the investigation of either land forms or landscapes, but really belongs to map analysis.

terrace landscape form. Fig. 4, p. 64, is a stream-line landscape and a specific example of a composite belted exogenetic landscape composed of two series of stream-corrasion landscape forms of different specific character. Fig. 5, p. 66, is a composite belted exogenetic mountain landscape with composite cliff and talus landscape forms below and composite ice-moulded disintegration and run-off landscape forms above. Figs. 4 and 5 illustrate the difference between geological and geographical photographs. As geological photographs they show clearly certain details of crustal architecture. As geographical photographs they are poor examples of composite exogenetic landscapes. Fig. 6, p. 145, is a specific example of a simple endo-exogenetic scarp mountain landscape, characterised by the repetition of a composite endo-exogenetic scarp and dip slope landscape form. Fig. 7, p. 147, is a composite belted endo-exogenetic plateau landscape with stream-corrasion landscape forms in the foreground, disintegration and run-off landscape forms in the middle distance, and endogenetic flexure landscape forms in the background. Fig. 8, p. 148, is a coastal block and basin landscape and a specific example of a composite endo-exogenetic landscape with simple fault scarp landscape forms and composite sheet and line corrasion landscape forms as the predominant repetitive features. Fig. 11, p. 173, is a simple exogenetic dome landscape characterised by the repetition of a simple dome landscape form. Fig. 14, p. 245, is a composite exogenetic dome landscape showing predominant composite physical disintegration and solution landscape forms in the foreground, and composite physical disintegration and line-corrasion landscape forms in the background. Fig. 12, p. 176, is a composite belted exogenetic valley landscape with stream-bed and bank corrasion landscape forms, human excavation and aggregation landscape forms, and chemical disintegration and sheet corrasion landscape forms respectively predominating. Fig. 13, p. 179, is a simple exogenetic coastal landscape characterised by the repetition of a sea-cave landscape form. Fig. 15, p. 247, is a composite belted exogenetic mountain landscape with ice-corrasion landscape forms repeated below, composite disintegration and line-corrasion landscape forms above, and composite ice-riven scarp and talus landscape forms atop. Fig. 16, p. 248, is a composite belted exogenetic valley landscape with simple stream-corrasion landscape forms below, and simple ice-corrasion landscape forms above. Fig. 21 is a simple exogenetic bad-lands landscape with a composite sheet and line-corrasion landscape form as the repetitive element. Fig. 22 is a composite belted exogenetic mountain landscape with composite moraine and glacier landscape forms, composite cliff and talus landscape forms, and composite cliff and snow-field landscape forms respectively predominating. Fig. 23 is a composite belted exogenetic landscape with composite stream-bed and plain landscape forms below, composite morainic knob and hollow landscape forms above, and composite ice-corrasion and sheet alluvial landscape forms atop.

The analytical investigation, description, and classification of landscapes here suggested will be seen to be independent of any consideration of topographical phase. The discussion of phase is obviously subsidiary to the classification of landscapes, and follows upon the com-

parative study of landscapes. Similarly the consideration of the effect of regional elevation and depression during exogenetic history is one which arises with the attempt to explain the occurrence or association of certain belts of landscape forms in belted landscapes. Rejuvenated valley landscapes, for example, may show a double belt of river scarp and terrace landscape forms. An incised meander landscape shows a peculiar association of certain stream-corrasion landscape forms with certain disintegration and run-off landscape forms. The study of the history of the landscape thus follows naturally upon the scientific investigation of its actual features.

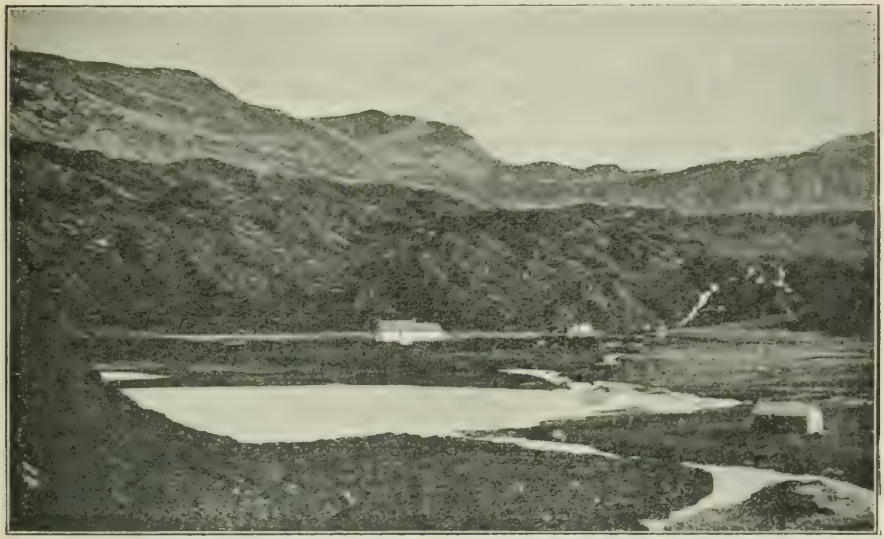

Photo by H.M. Geological Survey of Scotland.

FIG. 23.—Lochan an Iasgaich, Ross-shire.

An interesting question which arises with respect to certain exogenetic landscapes is that of the extent to which the Law of Slopes should be applied in the description and classification of the landscapes of deserts and of glaciated regions. It is now recognised that such regions have suffered great climatic changes, resulting in an alternation of pluvial with either torrid or frigid arid conditions. There is little doubt, however, that the degradation of the original endogenetic relief should be regarded as everywhere taking place normally under pluvial conditions, and that the occurrence of torrid or frigid arid conditions should be regarded as exceptional and more or less temporary. Wind and ice may thus be looked upon from the historical point of view as simply modifying an earlier relief determined by other agents. In the classification of existing exogenetic landscapes, however, we are concerned not so much with the history of the landscape, as with the recognition of the existing landscape forms. In deserts and in glaciated regions therefore the respective landscape forms should generally, for purposes of classification, be

referred to existing processes, except in cases which are clearly in conformity with the Law of Slopes. A moraine landscape much dissected by stream and run-off is from this point of view to be classified not as an Exogenetic Aggradation Landscape but preferably as an Exogenetic Degradation Landscape. The same remarks apply also to the classification of the Fold Mountains and the Relic Mountains of the text-books. Although we may recognise that historically all mountain landscapes are endogenetic, yet for purposes of exact classification only those mountain landscapes whose existing constituent landscape forms may be referred to endogenetic processes, directly or in accordance with the Law of Slopes, are entitled to be classified as Endogenetic Mountain Landscapes.

ERRATA.

P. 150, line 5, *for* "they" *read* "the plains in such cases."
P. 150, last line, *for* "effusive" *read* "eruptive."
P. 151, line 4, *for* "stopping" *read* "stoping."
P. 151, lines 23, 36, *for* "effusive" *read* "eruptive."
Pp. 170, 172, 175-8, *for* "corrosion" *read* "corrasion."
P. 172, line 7, *for* "corroding" *read* "corrading."
P. 172, line 47, *after* "other" *insert* "pluvial."
P. 176, line 18, *for* "tearing" *read* "flaring."
P. 248, lines 17, 18, *for* "special" *read* "specific."

GEOGRAPHY IN SCHOOLS: A REVIEW.[1]

By George G. Chisholm, M.A., B.Sc.

For all who are interested in the teaching of geography this is a very important work. It is based, as the author tells us (p. 213), to a large degree upon actual teaching experience, leading, as he informs us in his preface, to the modification of many of his ideas and plans as first tried. The author has also contributed to specialist periodicals some valuable studies in advanced geography, as readers of our own *Magazine*, as well as of the *Geographical Journal*, are well aware, and he has thus all the qualifications for writing a book on a subject of great importance and yet of great practical difficulty, viz., the due graduation of geography as a school subject. To the solution of this problem this book forms a very valuable contribution which should be read, and indeed carefully considered, by all teachers of geography.

So much being said, it will be clearly understood that if in what follows there are expressions of doubt and query, any objections that may be made are made in a sympathetic spirit, with a due recognition of the difficulties of the task that the author had taken in hand, and

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[1] *The Teaching of Geography.* By B. C. Wallis, B.Sc. (Econ.), London, F.C.P., F.R.G.S. Cambridge: University Press, 1915. *Price 3s. 6d. net.*

with the sole desire of seeing all those difficulties satisfactorily surmounted.

It is to be regretted that there is sometimes a certain want of lucidity in the author's exposition, that the language is not always even exact, that sometimes there is an apparent want of logical coherence in the points of view indicated in different parts of the book, and occasionally that the treatment of a subject is too summary to be sufficiently clear to all teachers, while, on the other hand, there is a good deal of needless repetition. When a new edition is called for, and that should be in no long time, it would perhaps be well to get rid, as much as possible, of these repetitions and devote the space thus gained to handling at somewhat greater length certain parts which are at present somewhat meagrely treated. Even where the present brief exposition may be adequate for most teachers of geography, it must be remembered that it is desirable that the book should come into the hands of those who are not at present greatly interested in the subject, although they may have to teach it, and also, what is perhaps still more important, that, in order to make it possible to have such a scheme of the teaching of geography as is here sketched out widely introduced, it is necessary to convince headmasters, who will be but too easily repelled by any obscurity. For one illustration of what is here in view, I may refer to what the author says on pp. 61-62 as to the explanation of monsoons at which children may arrive. "The crucial test of the clearness of the knowledge of the pupils," he says, "lies in their explanation of the desert of Thar." But one has to go to p. 133 to get the light upon that explanation which many a reader will desire to have where that statement is made.

The importance of the consideration with regard to the convincing of headmasters hardly needs to be dwelt upon, especially in view of the claim made, and undoubtedly rightly made, by the author, that a handbook for teachers should contain ideal as well as practical elements. His book indeed propounds an ideal scheme for the teaching of geography, and it is all the better on that account, even if the following out of that ideal is in no case possible at the present time. Still teachers will be able to judge for themselves how far it can be followed either in present circumstances or in circumstances that they may think it practicable to bring about. The author also gives some useful references for information as to what has been, in different cases, not only attempted, but actually achieved in the direction of his ideals. The adoption of an ideal scheme of course implies a clear conception of the goal at which we ought to arrive. The author endeavours to set that forth in his first chapter, but unfortunately he does so in a statement which can hardly be accepted as expressing even the author's own mind. "The science of geography," he tells us (p. 1), "deals with the sum total of human effort in relation to the environment in which human life is passed." It is obvious that such a definition as this would apply to a large part of medical science, and surely more of medical science than could possibly be included by any stretch under the subject of geography as it is understood by everybody, even the author. But we

can get at the author's actual conception from other passages of his work. On p. 2, for example, he tells us that for pupils in the geography class the essential matter is not the interesting processes by which rivers grow and lakes are formed, but the effect of such processes upon human life, and in his concluding chapter, which is entitled "The Human Science of Geography," he tells us that "the story of geography is the story of the triumph of the average man." What seems to be indicated in these and other passages of his work is that what we are concerned with in geography is the influences on human activities connected with place. Following this conception he is in various cases very trenchant in what he excludes from the consideration of the geographer. Again and again he tells us, as on pp. 3, 50, 71, 183, that the geographer has nothing to do with where minerals exist, but is only concerned with where they are actually worked. On p. 183, for example, he says, "it is frequently possible to state that a country is rich in zinc, or lead, etc.: but when the statement is made, it can have little value either in a geography text-book or in an answer to a question in the examination room." But surely such statements go beyond what is consistent even with the author's own conception of geography. If geologists, for example, can tell us that from the formation of the country it is likely to be rich in gold, zinc, silver, lead, and so forth, is that not likely to have an influence upon the work of prospectors and, perhaps ultimately, of railway promoters? Again, if important deposits of coal are known to exist in places where it is at present impossible to work them, will that fact nevertheless not be kept in view by those who are watching the tendencies of human development that may make them workable in the future, when, for example, population has increased in the neighbourhood of those mines from other causes, or when increasing economy in the transmission of power may make it profitable to work the mines on the spot and transmit the power to where it is required by a distant population. These then are influences upon human activity connected with place, and accordingly fairly fall within the author's own conception of geography. Again, on p. 51 he tells us that the world's fisheries from the school point of view present the same accidental nature as the world's mineral deposits, so that all that the pupil has to learn is where the fish are caught and where they are sent. The author maintains that by no means should the teacher of geography attempt to do the work of the science master (p. 33). For that reason he warns the teacher of geography that he must be very chary of what he says with regard to the barometer; but while he is thus rather exclusive in the way of limiting his subject, he says (p. 2) that the controversy as to the formation of fiord coast-lines may be a matter for the attention of the teacher of geography. One cannot but ask, according to his conception of geography, Why? It is difficult also to understand why, with his conception of geography, discussions in vegetable biology should have a place (p. 46), or why it should be necessary in the teaching of geography to have block diagrams showing the processes of river capture (p. 157).

Mr. Wallis lays much stress upon the scientific character of geography, and the importance which he attaches to his view of that

character leads him even to say (p. 217) that "the acquisition of topographical knowledge as such and for its own sake cannot be regarded as an essential feature either of geographical teaching or of geographical study." One is not quite sure of what Mr. Wallis means by the qualifying phrase "as such and for its own sake." If he merely means that no end is served either in the teaching or the study of geography, by merely getting up facts of situation without any ulterior purpose, that surely is a truism that did not need stating. But he seems somewhat to depreciate the importance of topographical features, regarding them as among the things made of little account by the progress of man's victory over his environment. We may be wrong, but this idea seems to influence his view of the comparatively small geographical importance at the present day of the Hudson-Mohawk traffic line. "There can," he says, "be no doubt, that in the history of the American colonies in the eighteenth century this depression was of profound importance, in fact, its importance is almost incalculable for the historian" (p. 124). But lower down he says, "Every advance made by the United States reduces the relative importance of the Hudson Gap." Mr. Wallis, as is well known, and as one can also learn from the present book, attaches great but not undue importance to quantitative investigations in the study of geography. If he will take the trouble to study the time-tables of the United States showing the passenger trains from the north-eastern ports to the west, we think he will be disposed to take a less depreciatory view even of the present-day importance of the Hudson Gap. And if he could procure authentic information (which, we believe, is possible) as to the amount of goods traffic between Chicago with the regions further west and the eastern seaboard, the probability is that the results he arrived at would give him a greatly enhanced idea of the present geographical importance of that topographical feature.

In his exposition of the scientific character of geography, Mr. Wallis lays great stress upon the nature of geographical generalisations. But on this point he is somewhat obscure. He tells us that these generalisations "are not of the nature of the scientific generalisation usual in schools, the generalisation of cause and consequence: geographical generalisations are of the nature of interaction, co-existence, continued co-operative action" (p. 26). Similar statements are made upon pp. 12, 74, 213. What he seems to mean in many cases by a geographical generalisation is the estimating in due proportion of the value of various influences operating in such a manner as to affect the value to man of a certain locality or region. But that is not what is generally understood by the term generalisation. And it may be added that a good many of the geographical generalisations in the true sense of the term which are to be found in Mr. Wallis's book are of a somewhat doubtful character. For example he says, "The indigenous [non-Caucasian] races, on the whole, mark the degree to which man has been controlled by the static geographic factors of his environment" (p. 39), while the story of the Caucasian races is characterised by the control of his environment by man (a statement that takes very little account, for example, of the Chinese); that in the United Kingdom factories and workshops are all

located on or near the coalfields (p. 86); that "essential similarities are presented by the winter rain regions wherever they occur" (p. 94); that monsoon rains are limited to the same area as the tropical temperatures, (p. 117). What is the essential similarity between the winter regions of Sicily, the south-west of British Columbia, the south-east and the extreme north-west of India, and the western seaboard of Japan, and what more typical monsoon area is there than northern China, which surely cannot be described as having tropical temperatures? Another generalisation on p. 52, where it is stated that "the element which introduces order into the treatment of town life is largely the question of the uses to which the coal deposits have been put," does not seem very appropriate when we consider how very few large towns of the country that produces by far the greatest amount of coal among all the countries of the world are to be found even in the counties that produce coal. The generalisation, such as it is, has been based upon too limited a view, the consideration almost solely of the British Isles and certain parts of Germany.

So much as to the general conceptions on which the book is based. We may now consider the nature of the course that he marks out for the duration of school life. The earliest stage Mr. Wallis, like probably nearly all other teachers of geography, considers should be taken up with descriptive geography, in the earliest stages of all in the form of narrative, preferably personal narrative. But even in this stage Mr. Wallis has some interesting observations as to the way in which the pupils may be made to co-operate with the teacher, and outdoor work combined with the indoor lessons. The next stage, suitable to boys and girls up to the age of eleven or twelve, he would devote to what he calls "transition geography, in which the pupil is mainly concerned with the investigation of geographical principles, rather than with the acquisition of geographical facts" (p. 24), while the third and highest stage, reaching up to the matriculation standard of the London University, is called systematic and argumentative geography, in which he says "it is necessary to provide the pupils with the data from which they can draw their own conclusions regarding the Position, Size, Relief, Climate, Natural and Cultivated Vegetation, Density of Population, Mineral and Fishing Industries, Occupations of the People, and Communications of any country" (pp. 53-54). Parenthetically, one may observe here that it is rather surprising to note, both here and elsewhere, the omission of drainage after climate as one of the points to which the attention of pupils should be drawn. A chapter follows giving a conspectus of the geography scheme, and there are others on quantitative work, and practical exercises on the use of the globe, contour lines, and holiday work, on test papers and examinations, and the ideal geography room and the apparatus. In all of these there is a great deal from which most teachers of geography will learn something profitable. Yet one omission will surprise many, namely, the absence of specific hints as to the use of hill-shaded maps, the necessary complement to contoured maps, in the teaching of geography. Mr. Wallis does indeed tell us (p. 149) that once the pupil has completed his study of

contours he can be introduced to the maps of the Ordnance Survey so as to appreciate the principles of hachuring, but all who are not already expert teachers of geography will look for more than this on this subject, which is surely of at least equal importance to that of contoured maps. For in most places where that outdoor work which Mr. Wallis rightly urges upon teachers must be carried on, there must be numerous cases in which the pupil examining the country solely with reference to a contoured map can hardly fail, if he is really profiting by that examination, to be struck with the fact that there are important features of the ground of which no hint is given in the map whatever, owing to the fact that these features, important as they are, lie wholly within the limits of two adjacent contours, if these are, say, at an interval of 250 feet of altitude. The chapter upon test papers and examinations is extremely interesting, as throwing further light on the author's conception of his subject and its graduation. Generally speaking, one may say that the questions are just of the kind that would be set by any intelligent teacher of geography, but one cannot help thinking that some of the examples hardly tend to clarify one's ideas as to the stages that he has described as transition and argumentative. Most teachers, one would think, will be rather surprised to see a question giving monthly rainfall and temperature data for two places, which pupils in the transition stage are asked on the strength of these data to refer to the districts in which they might be situated. Mr. Wallis expresses some surprise that questions are so seldom set requiring the candidates to do some map reading from the actual sheet of the Ordnance Survey, or a portion thereof. The probability is that this is not because examiners are not sensible of the importance of such questions, but because this is a case in which the ideal comes in conflict with the practical in consequence of the expense. The present reviewer on one occasion, and one occasion only, set a question of that nature, and that single question cost £4, 10s. to the examining body, and such expenditure of course can be justified only where the number of candidates is very large.

THE SO-CALLED MYTHICAL ISLANDS OF THE ATLANTIC IN MEDIÆVAL MAPS.[1]

By William H. Babcock.

St. Brandan's Island.

This romantic and venerable feature of the maps is of two origins —the belief in supernally endowered Isles of the Blest, easily traceable into prehistoric times; and the imputed legendary adventures of a nautical Irish abbot, St. Brendan of Clonfert (commonly known as St. Brandan), who died in the year 576. The basis of reality for each has been greatly embellished; but there is no great difficulty now in visit-

[1] For previous articles see p. 360 *et antea*.

ing "summer isles of Eden" in the Atlantic and elsewhere; and it is probable that the sailor-saint really navigated the warmer parts of that ocean on the eastern side, naturally touching a dozen islands or more, some of which might well seem more than earthly in their luxuriant beauty to one newly escaped from ranging the waste ocean, or skirting in hot blasts of air the repellent African deserts.

A surviving manuscript of St. Brandan's imram, or sea-saga, has been sometimes credited to the ninth century, and there are others in Latin and Gaelic of the twelfth. Internal evidence goes to show a considerably greater antiquity in the first simple narration than in the accretions of later versions, each striving to outdo all predecessors in the field of the marvellous. Whether there was any strictly contemporary record of the voyage, however brief, we cannot say.

Alexander von Humboldt[1] supposed that Brandan turned northward toward the Orkneys and Faroes: partly because the latter islands had a fine repute for sheep, and St. Brandan's tale made so much of an island where "the finest sheep" ever seen fattened on ever-luxuriant grasses. The Isle of Sheep was firmly planted also in Arab Atlantic tradition, although we are told that their flesh was bitter and uneatable when the Magrurin found them. Others observing St. Brandan's Island far westward on the globe of Behaim, and the maps of Ortelius and Mercator and Sebastian Cabot (which last avers that this island was found again in 1494), have pinned their faith to America, and even sometimes pictured St. Brandan preaching to the native wild red men. But the tenor of the narrative is altogether tropical or sub-tropical, excepting some extravagances, any of which might fit various climates. Also the task explicitly set Brandan in the beginning is to reach the island where another holy adventurer named Mernoc, then long lost, was believed to abide, and which had been "the first home of Adam and Eve." St. Brandan's instructions located it just "under Mount Atlas." Now this mountain chain is a conspicuous feature of all mediæval African maps, running down to the sea (as it does) near Lanzarota and Forteventura, the two most inshore of the outstrung Canary series, really detached summits extending the range far out to sea. The two islands named were indeed always (and naturally) better known to the civilised peoples of the mainland than the remoter members of the series, and bore the name of the Fortunate Islands from ancient times. Thus Edrisi about 1154 declares that the Fortunate Islands are two in number, that they are in the Sea of Darkness, and that Ptolemy reckons latitude and longitude from them. The surviving derivatives of the lost eighth-century Beatus map similarly bear the inscription Insulae Fortunatae where these islands should be. Again, Dulcert's map of 1339 omits all others of the Canaries, calls it Forteventura, almost exactly its present name, and marks on Laurenzi (Lanzerota) the cross of Genoa, commemorating the temporary occupation of this island about 1270 by the Genoese Lancelot Maloessel, who built upon it a tower that was found by Bethencourt still standing in the fifteenth century. There is nothing in the St. Brandan

[1] *Examen Critique*, etc., vol. ii. p. 166.

legend to contravene his presence for a time in the Canary group, especially in Teneriffe, according to the sixteenth-century assertion of Espinosa,[1] who cites an earlier work.

We read amid many marvels of St. Brandan's *Navigatio* that he visited a number of luxuriant islands, sojourned for a long time in one of them, and reached at last a coast whence he penetrated the interior by a forty days' journey, halting on the banks of a great river. This was a land of fruit and gems. In some islands he witnessed volcanic action, mistaking it for infernal fires. He listened to a multitude of birds at evensong, which were even miraculous in their singing. The natural beauties of his surroundings recall whatever one has read of the lovelier islands of the Canaries. It is no wonder that Bory de Saint Vincent in his essay on the Fortunate Isles, with St. Brandan's Island in mind, refers to "the fabled appearance of this eighth Canary" as if the last words indicate its normal status in popular belief.

But probably the Canaries never monopolised the saint's name, for no surviving map applies it to them, whereas a number of maps, much older than even Espinosa, call the Madeiras the Fortunate Islands of St. Brandan.

Possibly Maloessel's exploit may have sufficed to make Lancerota too familiar for a time to be quite confidently hailed as "Blessed," incidentally bringing out, as it would, some disparaging facts, such as the meagre supply of drinking water, and the prevalence now and then of hot winds from the desert. Madeira was notably exempt from such annoyances. The Carthaginians and Etrurians, according to Diodorus, had been greatly impressed by its merits and struggled for its possession centuries before his time. Its size and obvious advantages seem also to have greatly impressed Edrisi. The little group has been generally regarded also as Pliny's Purple Islands, and Strabo[2] had styled them long before the Islands of the Blessed. Evidently, whoever came to know of Madeira had always approved it exceedingly. Also it was remote enough to be safely credited with some magical attributes: and the saint was most likely to have lingered there on his southward way, connecting the cluster especially with his name.

That the name was emphatically thus applied early in the fourteenth century, if not before, appears in the Dulcert map of 1339. The Pizigani brothers repeat the identification in 1367. Certain others of that period—as Dalorto 1325, Gaddiano 1351, Pinelli 1384, and the author of the Catalan Atlas of 1375—present neither the name "Saint Brandan" nor that of "The Fortunate Islands," nor any collective designation of the Canary or the Madeira group, and therefore do not help us.

Dulcert labels the Madeiras "Insulle Set Brandany siue puelan." Possibly the last word should be "puellam," the letters *n* and *m* being then interchangeable, and the treatment of double consonants rather lax and capricious, as we see in the first word "insulle" for *insule*, islands.

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[1] Espinosa, Alonzo de, *The Guanches of Teneriffe*. Translated by C. R. Markham, p. 29.

[2] "The Golden Apples of the Hesperides, the Islands of the Blessed they speak of, which are still pointed out to us *not far from the extremities of Mauruisia and opposite to Gades*." —Hamilton's trans., vol. vi. p. 327.

Thus read, *puellam* might stand for the Virgin, especially as the Luzerne map, perhaps of that century, shows her kneeling there instead of the saint; but at any rate there can be no question about St. Brandan, whose final *y* is merely a substitute for *i*, as the *u* of *siue* should be read *r*. The Islands of Saint Brandan here make their first appearance by collective name in cartography.

The Pizigani map substitutes for this legend the words "Ysole dctur somniare sey ysole pone + le Brandany." There is some obscurity in this undoubtedly. Ysole is of course the Italian *isole*, islands; *dctur* seems to be an abbreviation of "dictur," needing only the restoration of the letter *i*. The third word was at first read by me as "sommart," but its final letter is an *e*, and what passed for the second *m* no doubt may be *ni*, the latter undotted, as happens elsewhere on this map. The character following "pone" seems merely the cross sign, as it might be made by the Saint, or as used to designate his holiness. Perhaps, then, we may fairly render the inscription as "The Isles of Slumber, or Islands blessed by Saint Brandan." To guard against any possible misunderstanding, the Saint or some other religious man is pictured conspicuously full-robed in the body of the map, bending over them in the attitude of benediction. Perhaps this is the only extant portrait of the Saint, on a map at any rate—a likeness hardly to be disputed so far away as our twentieth century. A few years later the alternative names blended into one, which appears as "Insulle Fortunate Sancte Brandani" in Beccaria's maps of 1426 and 1435, the former omitting *c* from the third word, in abbreviation or by accident. The inscription is above the Madeiras, but only about as far below the lowest pair of the Azores—now St. Michael and St. Mary—which may possibly be included. With little change of any kind it reappears on Pareto's map of 1455, Benincasa's map of 1482, and the anonymous Weimar one formerly credited to 1424, but perhaps the work of Conte Freducci about 1481. Santorem's incomplete copy removes the words "The Fortunate Islands of St. Brandan" farther from Madeira and nearer to the Azores than is warranted by my photograph of the original. There seems nothing to prove that any of the latter islands were ever included, although they may have been.

What looks most like it is the island marked with the name of St. Brandan on Bianco's map of 1448, which differs widely from that of 1436, and was made soon after the rediscovery of the lowest and middle groups of the Azores, but before that of Flores and Corvo. St. Brandan's Island of the later map is one of a string of supplemental islands west of the established north-and-south series of Azores, and corresponding in number, in subdivision, and north-western inclination with the two rediscovered groups. Of course the genesis of this is quite plain. Bianco believed that the Portuguese had found seven new islands, in two groups of a pair and of five individuals respectively, inclined as stated, and farther west than the position commonly given on the maps to the traditional islands from Corvo down; he therefore added the supplemental data to the orthodox delineation, which he had not the temerity to discard, and thus made two strings of Azores. He resorted

to memory and fancy in naming the supplemental series, for wholesale duplication of the old names would hardly do; thus the Canaries, the Madeiras, Arab legends and Irish Imrama were all made use of, the last especially in "I fortunati de s beati blandoni," to give literally the elaborate and slightly modified form of the name applied to the largest of the series. It occurs in the main sub-group, and may be an enlarged reflection of Terceira. Its form approximates to a Maltese cross with long arms, as does that of its rather distant consort I Falconi (St. Michael); but the Brandan island is confidently drawn in deep black, whereas I Falconi is pale and dubious.

About the same period, apparently prompted by the same considerations but not copying,[1] a Catalan map also presents the slanting north-western outer series of islands, as well as the inner one parallel to the coast, and retains some names, though adding others and leaving some islands unnamed, for the number is increased. Saint Brandan's Island is altogether omitted, but Ataello (Antilla ?) is given, though not in the same relative place. Possibly this is a system of growing confusion in the ideals of the two islands, such as appears more distinctly when Behaim, in 1492, gives to St. Brandan's Island the traditional size and form of Antillia.

Bianco's conception, as we see, was that of a single island named after the Saint, in a chain-form archipelago miscellaneously named. This did not meet with favour. As we have seen, later maps continued to show St. Brandan's Islands as the Madeira group, nearly until the time of Columbus. But Bianco perhaps prepared the way for the totally independent and individual presentation of St. Brandan's Island as it appears in Behaim's (1492) globe already mentioned. This presents I Sant Brandan in a lower latitude than the Cape Verde Islands, and much nearer the longitude of Japan than that of Africa: also farther south and much farther west than Antillia, which is placed opposite the Canaries.

According to Ravenstein's[2] very thorough and comprehensive study of this globe, the conditions of its production, its chief author and its subsequent history, there can be no absolute certainty as to the details of the original delineation, which has repeatedly faded and been replaced, unless by removing the covering on which the map is drawn, and treating it as a palimpsest, from which all superimposed markings and inscriptions must be removed as a first step; and in particular it is known that in one restoration the draftsmen employed were about to transpose Antillia and St. Brandan's Island as they appear now, when the protest and arguments of an expert cartographer dissuaded them. But the present condition of the map, and in particular the illustration of these islands, must leave an uncomfortable feeling that the draftsmen were possibly right, in which case St. Brandan's Island would more nearly agree in size and position with previous representations and beliefs. It seems clear that there has been some strange shuffling of names and

[1] Fischer's *Sammlung*, xiii.

[2] Ravenstein, E. G., *Martin Behaim, His Life and Works*, 1908, p. 59.

forms between these more remote islands of the map, either by the well-informed Behaim or by some one of his improvers.

Probably we have a clue to the southerly position on his globe of the great rectangular island which now bears St. Brandan's name in the 1448 map of Bianco above referred to. This shows opposite Cape Verde and a little lower in latitude a line of coast almost on the very border of the map parchment, with an inscription in a Venetian dialect to the effect, according to Messrs. Oldham and Battalho-Reis, that this is authenticated and 1500 miles away. Others read "long" instead of the word last given. There seems reason to suspect that some European between 1436 and 1438 had crossed the narrow waist of the ocean between Cape Verde, Africa, and Cape St. Roque, Brazil, and that the land thus found was confused with that of the earlier legend. The location of St. Brandan's Island on Behaim's globe would indicate north-eastern South America rather than anything else. Moreover, the map of Juan de La Cosa, embodying data from the voyages of Columbus, Cabot, and others, marks a large rectangular island (evidently imitating Antillia or Behaim's St. Brandan) just off that coast, with an inscription stating that this is the island which the Portuguese found. The map was of the year 1500 when Cabral accidentally happened upon Brazil—but it does not appear that the news could have reached home in time to influence the map, nor if it did that an unnamed quadrilateral island offshore would be a probable result.

There is no island of St. Brandan in the Portuguese map of 1502, which first presents the names Cuba and Antilie together; nor in that of Peter Martyr, 1511.

Nevertheless, the belief in a single St. Brandan's Island survived, though the increase of travel along and near the route from the Canaries moved it much farther northward on the maps.[1] Thus the one attributed to Sebastian Cabot, 1544, shows it in the latitude of Cape Breton Island and farther west than the easternmost point of Labrador.

This single presentation seems to have set the fashion during a hundred and fifty years, for the maps of Descelliers 1546, Ortelius 1587, Hakluyt's[2] illustrating Peter Martyr 1587, Mercator 1595, and Matthias Quadus[3] 1608, agree in presenting it west of Ireland, sometimes half-way across, sometimes much more. Generally it is shown beyond and above Brazil Island.

The preference for these cold waters abundantly proves the dying out of the old tradition of the summer isles where the holy explorer abode for a season, leaving his blessing. Perhaps the growing influence of the Reformation and the increasing number of Protestant mariners and map-makers may be responsible for the comparatively early disappearance of this island name. It left the maps altogether not many years after Buss appeared there, the latest-born of the Mythical Islands (except some

[1] Kretschmer, *Entdeckung*, Taf. xvi.; Winsor, J., *From Cartier to Frontenac*, p. 68. The map of John Dee, in Winsor's work above, also shows St. Brandan's Island in American waters, even farther west than Cape Race.

[2] Nordenskjöld, *Facsimile Atlas*, text, p. 131, map.

[3] Nordenskjöld, *Facsimile Atlas*, Pl. xlix.

trivial islets), and the offspring of a northern mariner's error. It had become easier for men to believe in an island with such a name, or in Mayda or Brazil or Green Island, than in anything saintly; so these lingered on, appearing at first regularly, at last occasionally, for more than two hundred years after St. Brandan was gone.

Of course the later shiftings of the name and island from place to place, under the pressure of exploration and enlightenment, can indicate nothing; but it is significant that Madeira (di Legname, the forest island) and its attendants are the only islands connected with St. Brandan by any map inscription prior to the Portuguese rediscoveries of the fifteenth century, also the only ones on which, at any period, St. Brandan is exhibited as bestowing his benediction. In its earliest appearances the Saint's name is provided with such pendants as "The Isles of Slumber" and "The Isles of the Virgin"; afterwards the expression "The Fortunate Islands," in the sense of beatitude, was consistently in vogue. From all this we may gather that Madeira has the best *prima facie* claim to be considered the chief island of St. Brandan, and that through the centuries her reputation was pre-eminent as an abode of delight and a forest-queen of the seas.

Who first observed with such emotions her wooded heights no one can say: but Diodorus Siculus[1] offers the following description, already alluded to, including an account of a discovery perhaps a thousand years before Christ, perhaps a little later:—

"Since we have gone through the islands lying eastward on this side within the pillars of Hercules, we shall now launch into the main ocean to those that lie beyond them, for over against Africa lies a very great island in a vast ocean of many days' sail from Lybia westward. The soil here is very fruitful, a great part whereof mountainous, but much likewise champaign, which is the most sweet and pleasant part of all the rest, for it is watered with several navigable rivers, beautified with many gardens of pleasure, planted with divers sorts of trees and abundance of orchards interlaced with currents of sweet water. The towns are adorned with stately buildings and banqueting houses up and down, pleasantly situated in gardens and orchards, and there they recreate themselves in summer time as in a place accommodated for pleasure and delight.

"The mountainous part of the country is clothed with many large woods and all manner of fruit-trees. There you may have game enough in hunting all sorts of wild beasts.

"The air and climate of the island is very mild and healthful, so that the trees and fruit and other things that are produced there are fresh and beautiful most part of the year.

"The Phœnicians passed at length beyond the pillars of Hercules into the sea called the ocean, and first they built a city called Gades near to Hercules' Pillars at the seaside on an isthmus of Europe, in which among other things proper to the place they built a stately temple to Hercules and instituted splendid sacrifices to be offered to him after the rites and customs of the Phœnicians. This temple is in great veneration to this day.

[1] Vol. i. chap. ii., at beginning.

"The Phœnicians therefore having found out the coasts beyond the Pillars, and sailing along by the shores of Africa were on a sudden driven by a furious storm far off into the main ocean, and after they had lain under this violent tempest for many days they at length arrived at this island; and so coming to the knowledge of the nature and pleasantness of this isle they were the first that discovered it to others, and therefore the Etrurians when they were masters of the sea designed to send a colony thither; but the Carthaginians opposed them, fearing that most of their own citizens should be allured through the goodness of the land to settle there, and likewise intending to keep it as a place of refuge for themselves."

Allowing for embellishments in the matters of advanced civilisation and Noah's-Ark-like variety of game, this island by its situation, its climate, its fertile lowlands, its abundantly wooded mountain ridges, and its general attractiveness can be no other than Madeira, as indeed it appeared to the translator about a hundred years ago, whose words we have been following, for his assured beginning of the chapter heading "Of Madeira" bears unequivocal witness. We are assured that it remained well known to the Etrurians during their brief maritime ascendency as to their rivals the Carthaginians, no less than to the Phœnician ancestors of the latter who found it, and to the Sicilian historian writing so long afterward, although he might have been puzzled to point the way.

The precise time of that first finding known to Diodorus is vaguely given, but it was certainly after, and apparently not very long after, the founding of Cadiz, about 1100 years before Christ. Indeed, it was nearly impossible that this conspicuous and very tempting island should long escape the eyes of that most enterprising and inquiring people, issuing in sea swarms from their new prosperous Atlantic city.

The explicit and emphatic statement about the upland woods is particularly important, as laying emphasis thus early on the characteristic which has supplied in divers languages the name, the Forest Island, which it has usually borne in later times—rarely being called anything else—and bears even yet.

In the very long period of the power of Phœnicia, extended by that of her overgrown western colonies, we may well suppose that it was fairly often visited,[1] for the Carthaginian coins found on the vastly more distant Corvo awaken visions of zealous and untiring exploration, which would find Madeira little more than a near-by place of rest on the way.

The classic nations of the Mediterranean seem to have at least remembered the little group, which must have remained in the knowledge of the coast people long after the decline of Rome, and been visited sometimes by fishing vessels, if by few beside. Then from the north Brandan perhaps came down to the same shores; and the Magrurin later may have passed it, for, leaving Lisbon,[2] they reached, according to

[1] Humboldt, *Exam. Crit.*, vol. ii. p. 237.
[2] Edrisi, *Geography*, Third Climate, 1st Section.

Edrisi, an island so near the shore of Africa, at a point called Asafi, that smoke rising thereon may be seen from the mainland. Other wanderers of that nation almost certainly became well acquainted with the island of the forests, if we may judge from Edrisi's geography and some Italian map-indications of Arabic voyages in more northern waters. Coming and going from Morocco, Madeira lay on or near their course, and must have been well known.

Edrisi tells us on the authority of Ptolemy that there are 2700 islands in this sea, and gives the names of a few of them, with certain other data, choosing, he says, the ones which lie near the mainland, and are inhabited and cultivated in some measure.

Beside some unknown record of the Magrurin expedition, Edrisi's sources include a narrative of the exploring and other exploits of a mythical hero, Dzou l'Carmain, confused with Hercules and Alexander the Great, also a Book of Wonders containing divers nautical items.[1] Among these we find mention of the Morocco merchants who visit one of these Atlantic islands to obtain certain commodities, and accounts of two fleets, one apparently Arabic, the other French, the latter being sent out to another island after "birds like eagles which feed on marine animals and an herb which is an antidote for poison." It failed in this quest, being wrecked utterly. Of these islands in the Sea of Darkness we also read that on Sara the inhabitants attacked Dzou l'Carmain and his company with stones; that those of the Isle of Female Devils wear leaves for garments, and the men are like the women in appearance, having no beards, though they make war on marine monsters—perhaps by some kind of canoe whale-fishery; that the Isle of Delusion is large and dominated by a mountain, on the side of which live small brown vegetarians with beards descending to their knees; that the equally large island El Ghaur abounds in all kinds of herbs and plants, and has places of retreat for the savages, also cattle with horns of great length; that Alexander the Great destroyed a dragon on Al Mustachkin, which is very populous and well cultivated, containing a city with dominating citadel; that the isle Calhan is occupied by people with animal heads (baboons?); that two brother magicians, after whom another island was named, were pirates, turned to rocks on the seashore as a punishment; that the mutton of the Isle of Sheep is bitter and uneatable; that Raca is the name of the Isle of Birds, and that Laca produces aloes in great quantity. But the elongated island of Saisland (15 days by 10) seems to be the largest and most important of all. It had once been populous, but civil wars had caused emigration.

This Saisland is more than likely to be Madeira exaggerated. It cannot be Iceland, as has been suggested, because of the author's explicit exclusion of islands distant from the continental mass, and for lack of geographical and historical correspondence. Lelewel seems to be of the same opinion, having applied the name on a reconstructed map to an elongated island a little above the Straits of Gibraltar,[2] which also appears on the

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[1] Edrisi, *Geography*, Jaubert's trans., Third Climate, 1st Section.

[2] Bodleian Library, Oxford.

world-map of the fifteenth century (Pococke manuscript copy of Edrisi's *Geography*). Precise identification is difficult, by reason of the discrepancies between the maps of the few surviving Edrisi manuscripts, even the detailed climate-maps differing considerably as to the islands from the world-map of the same manuscript. If we could ever find the original and long-lost silver *Tabula Rotunda Rogeriana*, or any certainly exact copy of it, we should know where he meant his names and descriptions to apply. For the present it is enough to believe that even where they differ, the various Edrisi maps mean to show Madeira in illustration of his description of Saisland. Comparison of them leaves also a conviction that Edrisi knew something of all the archipelagoes east of the middle Atlantic, as he knew something also in a distorted way of the British Islands and more northerly countries. His delineation (on the Pococke MS. world-map) of the Cape Verde Islands, the Canaries, the Madeiras, and the Azores, with perhaps one or two more, as a long chain parallel to, and nearly equidistant from, the old-world mainland, was perhaps determined chiefly by the limit of the circular map border. The less complete corresponding map of the Greaves manuscript omits them, but its few detail climate-maps show enough of them to make it probable that such a series belonged to the original. With somewhat greater adaptation to the insular facts in the case, it is repeated in the seventeenth-century map of Sfax, another Arab. It seems also to have dominated the general idea of the Azores among Italian and Catalan geographers from the time of the *Atlante Mediceo*, 1351, for more than a hundred years, though at that date all of these islands were known, as well as all the Canaries and Madeiras, and most of them were given the names that still survive.

It may be noted in confirmation that by Edrisi's island notes above summarised, this Saisland is distinguished from the Island of Birds like Eagles, which would naturally be one of the Terceres or Azores (quite probably Terciera or Corvo); also from the island where war is made on the sea monsters, perhaps Fayal, which is still an active whale-fishing station; also from the Islands of the Brother Magicians, which Bianco (in 1448) identified, as los Hermanos, with the Cape Verde cluster; also from the two Khalifat or Fortunate Islands, apparently Lanzerota and Forteventura; also from the Island of Sheep, which may be Teneriffe, with one or two other individual identifications of more dubious character. This brings us practically to Madeira as a last resort, by the process of elimination.

In Edrisi, as in the much earlier Diodorus, we find the satellites of Madeira ignored, but they come again into view on the mediæval portulano charts of the fourteenth century and later, as we have them on our modern maps, even with the same names, as early as 1351.

These are Porto Santo, about fifty miles north-east of Madeira, the lesser Deserta and some smaller companions, collectively known as Las Desertas, much nearer on the south-east. Half-way to Teneriffe is the more numerous rocky cluster of the Salvagies, belonging to the Madeira group politically, but hardly geographically, and never apparently included under the Fortunate Islands of St. Brandan. These are visited

sometimes for gathering seaweed, as the Desertas are visited by goat-hunters and rabbit-hunters, but perhaps both have always remained without permanent inhabitants, as now.

Now the same names, applied to the same lesser islands, including the remote Salvagies, appear, with hardly even verbal changes, and applied in the same way, on the *Atlante Mediceo*, 1351, the Catalan Atlas, 1375, and the Pinelli map, 1384. These maps all give the middle island the Italian name Legname, from which "Madeira" was translated by the Portuguese. It does not differ in meaning substantially from Markland, I de Legname being the Isle of the Woods, and Madeira simply continuing the same designation.

But the names must have been a little uncertain for a time, after the Italian discovery. Dulcert, 1339, calls Porto Santo "Primaria," an appropriate choice, for it would naturally be first seen, and was in fact occupied, by the Portuguese for several years before they sought out Madeira. He also calls Deserta "Canaria," perhaps for some rumour of the name, with little clue as to location, for he shows nothing of the Canary group except Lanzerota and Forteventura, and apparently knows nothing of the Salvagies. To Madeira itself he gives the name Capraria, chiefly interesting as doubtful evidence that goats were on this island a hundred years or so before the Portuguese rediscovery and colonisation. The name was a favourite one where applicable, being affixed to St. Michael also not very long afterward. The general aspect of this little Madeira cluster on Dulcert's map in name and form indicates novelty and uncertainty; but it is quite unmistakable as a whole.

The Pizigani map of 1367 has its own variations in detail, shifting the name Canaria to the middle island (Madeira), leaving Porto Santo unnamed, and enormously enlarging Deserta, which receives the strange name Caporizia, probably Caporiccio, "the fright which makes the hair stand on end." It has a strange cleft on the right side, which may, or may not, be without bearing on the name. Perhaps the most likely conjecture is that some alarmist sailor's yarn—but not the true data of the *Atlante Mediceo*—had reached the Pizigani. Yet the Madeiras are right in number again on this map, and nearly in arrangement under the general caption Isles of Slumber, or Islands Blest by St. Brandan.

Geronimo Giraldi's map of 1426 confirms the Pizigani error in a measure, by making Deserta four times as large as Porto Santo, though still much smaller than the main island, which is exaggerated, being made a circle-segment approaching a semicircle, with the curved side uppermost, the other scalloped and hung with pendants—an exceedingly artificial form, reminding one of a chandelier-fitting rather than any possible geographical feature. The Zuan da Napoli map, which may be a little earlier, for it uses both Italian and Portuguese names and does not show the Canaries, gives an unusually correct presentation of Las Desertas, though with the chief islet and one other still too large. He makes the name Salvagies do for both clusters, prefixing Isole to the more southerly and Ille to the more northerly. His main island is more moderate in size than Giraldi's, and has the pendant islands of the latter detached, but looks as though this other might have developed from it.

Zuan da Napoli is perhaps the first to give us the modern name, which he spells Madera, as was most common until the present orthography came into vogue. Giraldi makes it, however, Madiera.

This brings us down again to the Portuguese occupancy of the Isles of Slumber, the Fortunate Isles blessed by St. Brandan, which holy name we have seen was gradually exiled to new quarters of the sea. Thenceforth the maps afford us little data concerning them beyond what has been given, but modern histories, books of description, and encyclopædias are sufficiently full.

To summarise: Madeira was the first St. Brandan Island, so far as we can now determine, sharing the title with its little neighbour Porto Santo and a few islets; afterward, as these became well known, the name was shifted in popular belief and cartographic representation to supposed islands farther west, south-west, and north-west, according to conjecture and nautical rumour. Sometimes it may have been more or less confused with Antillia, sometimes attracted to the neighbourhood of Brazil; but whatever reality inhered in it belonged mainly to the Forest Island reported from of old as supernally delightful.

RUMANIA AND THE WAR.[1]

(With Sketch-Map.)

On his return from Bukarest last winter Dr. Seton Watson lectured to the Society on Rumania. It is perhaps unnecessary to remind our readers of the high position which Dr. Seton Watson has won as an exponent of that portion of the Continent which a former lecturer described as "the whirlpool of Europe." His Scottish love of liberty and fairplay has impelled him for many years to take the part of the oppressed nationalities of the Austro-Hungarian empire. As "Scotus Viator" his name is well known to the readers of the *Spectator* and the *Times*, in both of which he set forth the sufferings of his Slav friends, and exposed the merciless exactions of their oppressors. In reading his articles one noted the zeal with which he pursued his sacred task, as well as the strength and beauty of the English in which he vindicated the claims of the oppressed.

Dr. Seton Watson has written numerous books on the cause which he has made his own. His *Racial Problems in Hungary* will be remembered as one of the gravest indictments ever brought against a country which boasts that it possesses constitutional government. His *Absolutism in Croatia* is a similar attack on the brutal methods of the Austrian Monarchy. After these exposures of the oppression rife throughout the Austro-Hungarian Empire it is not surprising to find the rulers of Austria and Hungary in full alliance with the rulers of Germany and Turkey.

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[1] *Roumania and the Great War.* By R. W. Seton Watson, D.Litt. London: Constable and Co., 1915. Price 2s.

In the present volume, which is partly based on his lecture to our Society last February, Dr. Seton Watson says he has merely attempted to give the salient features of Rumanian history and to provide a brief estimate of Rumanian policy in relation to the present Great War. He also provides in appendices statistics upon which must necessarily rest any estimate of the probable frontier between Rumania and Hungary and between Rumania and Serbia after the war. The map accompanying this article has, with Dr. Seton Watson's kind permission, been reduced from that he had specially prepared to illustrate his description of Rumania in the book.

Dr. Seton Watson reminds us that "it is not generally recognised, as it should be, that thirteen out of the twenty independent states of Europe have a smaller population than Rumania; that her territory greatly exceeds in area every other Balkan state, as well as the kingdoms of Belgium, Holland and Denmark, and the republics of Switzerland and Portugal; that the Rumanian race, in the present kingdom and its neighbouring countries, already numbers between twelve and thirteen millions; that the Rumanian army takes rank immediately after that of the six Great Powers; and that her trade almost equals in volume the combined trade of Serbia, Montenegro, Bulgaria and Greece. Without some knowledge of Rumania and her policy it is impossible to understand the Near East, and it is becoming increasingly obvious that her attitude will have a very great influence, perhaps a decisive influence, upon any settlement in the Balkan Peninsula."

It is important to note, in connection with the settlement of frontiers at the close of the present war, that while the present kingdom of Rumania has a total population of 7,500,000, the Rumanian race in adjoining countries has the following populations:—

In Hungary (including Transylvania),	3,500,000
In Austria (Bukovina),	230,000
In Russia (Bessarabia),	1,350,000
In Serbia (Timok District),	200,000
The Coutzo-Vlachs (or Aromani) of the Balkans,	350,000
	5,630,000

There are thus between five and six millions of Rumanians outside the present boundaries of the kingdom of Rumania, who, in any future re-arrangement of the map of Europe, would expect to be included in that kingdom. This would bring up the population of the kingdom to 13,130,000, whereas the Southern Slavs (Serbs, Croats, and Slovenes), if united by the present war, could show a population of only 11,000,000, and the Magyars, who have hitherto dominated Hungary, would have to take third place with only eight or nine millions. Indeed, Dr. Seton Watson declares that "an independent Hungary, if erected on racial lines, would not include more than seven million Magyars. The Bulgarians, even if they acquired every inch of territory which they claim as Bulgarian, would not exceed five or six millions. The Greeks, even if they succeeded in uniting their entire race in Europe and in

ROUMANIA AND THE ROUMANIANS
English Miles
0 10 20 30 40 50 100
Racial boundaries.
International boundaries.
Boundaries of Galicia, Bukovina, and Transylvania.
Roumanian.
Magyar.
German.
Ruthene.
Serb.
Bulgarian.
Mixed Roumanian, Bulgarian, and Turk.
Erratum—The names of the two coast towns Constantia and Mangalia should be transposed on the map.
BUDAPEST
HUNGARY
TRANSYLVANIA
SERBIA
BULGARIA
RUMANIA
BUCAREST
JASSY (IASI)
BELGRADE
BOSNIA
BLACK SEA
RUSSIA
AUSTRIA
GALICIA
Emery Walker Ltd. sc.

Asia, would still be less than seven millions, even according to the most liberal estimate. The Czechs and Slovaks, if they could form an independent state, would not greatly exceed nine millions. The Albanians, so far as their number can be estimated at all, are only about a million strong. It will thus be seen that, of all the races which lie to the southward of the great racial blocks of Germans, Poles, and Russians, the Rumanians are unquestionably the strongest."

A romance attaches to the history of the Rumanian race. It does not belong to one of those vast human hordes which swept over Europe from some unknown locality, but had its origin in the centre of ancient civilisation—in Rome itself. Dr. Seton Watson has no hesitation in affirming that "the modern Rumanians are the descendants of those Roman colonists whom Trajan planted for the defence of the Empire against the Northern barbarians." The Roman province of Dacia included the greater part of the present kingdom of Rumania and of Transylvania, its capital Apulum being in the latter, and now known as Karlsburg.

In keeping with its history the Rumanian race shows many signs of its Latin origin. Dr. Seton Watson says that that origin "is obvious to any one who walks through the streets of Bukarest; still more to any one who visits the remoter villages of Transylvania and sees the pure Roman types among the peasantry. Above all, the Rumanian language is an unanswerable proof of linguistic continuity, its grammar and syntax being predominantly Latin." Of course many Slavonic words have crept in by contiguity with Slavonic races, but the Rumanians justly pride themselves on their Roman origin.

The modern kingdom of Rumania is the result of the union in 1861 of the Principalities of Wallachia and Moldavia, but it was the reforms effected during the long reign of Prince Charles (of the Roman Catholic Southern Hohenzollern family), for forty-eight years from 1866, that consolidated the kingdom and made it the most powerful independent state in south-eastern Europe. Owing to the hostility of Europe, however, Charles did not till 22nd May 1881 assume the crown of Rumania, which was forged from Turkish cannon captured at Plevna by the Rumanian troops.

Unlike Serbia or Bulgaria, whose noble families were exterminated by the Turks, Rumania has preserved a powerful aristocracy of her own, the so-called *Boyars*, who represent the last survival in the Balkans of feudal landed proprietorship. Dr. Seton Watson points out that this fact operates in two ways and is resultive either of a class of distinguished diplomats or of extravagant idlers.

While Rumania thus possesses an aristocratic and feudal tenure of land, the situation of her peasantry is still very unfavourable compared to that of Serbia or Bulgaria, where every peasant owns his own land and poverty is almost unknown. Although reforms have been introduced as the result of the very grave agrarian outbreak of 1907, Dr. Seton Watson considers them quite inadequate, and states that "the Liberal party, though by halting and timid steps, has come to commit itself definitely to a far-reaching policy of land purchase."

He informs us that "Rumania possesses a regular system of party government, resembling in technique that of Great Britain more closely than that of any other continental state. In marked contrast to Bulgaria, where each of the very numerous parties is a mere clique labelled with the name of an individual Minister, Rumania has been ruled alternately for the last half century by the two great parties, the Liberals and the Conservatives. . . . At the same time, the franchise is narrow, complicated and superannuated. The existing curial system, under which the voters are divided into several distinct electoral colleges, gives an undue share of political power to the landed class. As a result, there is a certain amount of electoral corruption, though in this respect Rumania is wellnigh spotless compared to her neighbour Hungary, who has long held the record in Europe for the grossest possible political and electoral corruption."

According to Dr. Seton Watson, Rumania has been badly treated by those who would now pose as her friends. Russia robbed her of Bessarabia, while "Britain, after showing but little interest in the creation of Rumania, ignored her politically during the critical years when she most stood in need of help and sympathy; allowed the great Jewish financiers to boycott her on the London Stock Exchange; showed no perception of her commercial possibilities, and thus naturally forced her to turn to Germany for expert opinion and for capital." France having also neglected her, the three *entente* Powers lost all political influence in Rumania, which for a whole generation revolved in the orbit of Austria-Hungary.

To appreciate the influence of Rumania in Europe and the claims which she may justly put forth for a rearrangement of boundaries at the close of the war, we must consider not merely the Rumanians within the present kingdom but those in neighbouring states. For example, in Transylvania, which is ruled by the Magyars of Hungary, Rumanians have for centuries formed the great majority of the population. Dr. Seton Watson contributes a learned and complete account of the troubled history of Transylvania during which the Rumanians repeatedly asserted their national claims only to be crushed by their Magyar masters. He states that "the change of *régime* which followed Austria's defeat at Königgrätz left the Magyars supreme arbiters of the fate of every race in Hungary." It should be explained that the Magyar race is of Turanian origin and is utterly opposed in every respect to the Rumanian race which is of Latin origin. Dr. Seton Watson denounces the attempt of the Magyar oligarchy to subject to Magyar thraldom the Rumanian and other non-Magyar races comprised in the kingdom of Hungary, characterising it as "a monstrous crime against Nature, an attempt to fight the stars in their courses." He points out that the Archduke Francis Ferdinand took an enlightened view of this question, that his murder has been an annihilating blow to the Rumanians and Slovaks of Hungary," and that in destroying their main prospect of effective help from *within* the monarchy, it almost inevitably prepares the way for a transference of their allegiance to outward influences."

He insists that the future of the Rumanians of Transylvania "is for

the kingdom of Rumania a matter of life and death in a sense which cannot even remotely be applied to the Rumanians of Bessarabia and the Pindus." Russia acquired Bessarabia by conquest from its Turkish suzerain in 1812, but was compelled in 1856 to restore it to its rightful owners the Rumanians. In 1877, however, in spite of the gallant assistance she received from Rumania in the war against Turkey, Russia deprived Rumania of Bessarabia, a procedure which alienated the Rumanians and caused them to gravitate towards Germany and Austria. The Russification of Bessarabia seems to have been a mild process compared to the overbearing Magyarisation of Transylvania, with the result that "there is no such national movement in Bessarabia as in Transylvania, and Bessarabia's contribution to the stream of Rumanian national life has been almost negligible. While Transylvania has supplied Rumania with a long succession of poets, journalists, doctors, and politicians, Professor Stere, the distinguished Liberal deputy and economist, stands alone as the representative of Bessarabia."

Dr. Seton Watson concludes his interesting and valuable treatise by referring to the speculation which has been rife as to the probable attitude of Rumania during the present war. He reminds us that "the explanation of her inaction is much more complex than is generally supposed." To begin with, few are aware that Rumania was at the outbreak of the war bound to Austria-Hungary by a secret military convention for defensive purposes. This convention was the work of King Charles, a Hohenzollern prince, who also urged his Council to proclaim war against Russia. The Council declined to do so, and on the king's consulting the Rumanian Officers' Corps, he found only 110 out of about 6000 in favour of war against Russia. King Charles died on 11th October 1914, and was succeeded by his nephew, who ascended the throne of Rumania in his fiftieth year under the title of Ferdinand I. Dr. Seton Watson does not indicate the new monarch's attitude towards the present war, nor that of his powerful prime minister M. Bratiano, but he reminds us that Rumania has to settle with her neighbour Bulgaria before engaging in any war. Bulgaria has never forgiven Rumania for annexing Silistria and Bulgarian territory in the Dobrugea by the treaty of Bukarest, which was wrung from Bulgaria in 1913. Dr. Seton Watson expresses the opinion that "really cordial relations between Rumania and Bulgaria could only be restored by a reversal of the settlement of 1913." He also points out that the occupation of Constantinople by Russia would be distasteful to Rumania, as the Straits are her sole outlet to the open sea. Rumania would wish to have the same rights of access for her commerce and her warships as those enjoyed by Russia.

For all the above reasons we need not be surprised that Rumania has proved tardy in declaring her sympathies during the present war. At the same time Dr. Seton Watson, in closing his lecture to the Society, expressed his belief that these sympathies are with the *entente* Powers, an opinion recently confirmed by Count Cheddo Miyatovitch, late Serbian Minister to the Court of St. James, who said : "The sentiments of the Rumanian people have always been in full sympathy with the aspirations

of France and Italy, and they have never been more in sympathy than now, when these two countries are fighting for the highest ideals of humanity, and for a permanent peace in Europe."[1]

RALPH RICHARDSON.

PROCEEDINGS OF THE ROYAL SCOTTISH GEOGRAPHICAL SOCIETY.

AT a meeting of Council held on July 5 the Livingstone Gold Medal was awarded to the Right Hon. Earl Kitchener of Khartum, K.G., G.C.I.E., G.C.S.I., G.C B., G.C.M.G., K.P., O.M., Secretary of State for War, in recognition of his topographical work in connection with the survey of Palestine and as director of the survey of Cyprus, as well as in recognition of his signal services to the State. The Society's Gold Medal was awarded to Dr. J. Scott Keltie, late Secretary, Royal Geographical Society, in consideration of his valuable services to geographical science, especially during his thirty years' connection with that Society. Lord Kitchener has intimated to the Secretary of the Society his acceptance of the medal in the following terms:—

"DEAR SIR,—I regret that, owing to my absence in France, I was unable to send an earlier answer to your letter of the 6th instant, in which you inform me that the Council of the Royal Scottish Geographical Society have unanimously decided to award me the Livingstone Gold Medal.

"I shall be obliged if you will be good enough to convey to your Council an expression of my deep appreciation of, and sincere thanks for, this signal mark of distinction, and to assure them that I shall always entertain a high sense of the honour which they have thus conferred upon me.—Yours very truly, KITCHENER.

"WAR OFFICE, *July* 11, 1915."

The Society's Rooms in the Synod Hall will be closed during the month of August.

GEOGRAPHICAL NOTES.

EUROPE.

Report of Ordnance Survey.—We have received recently the *Annual Report* of the Ordnance Survey for the period 1914-15, and note that during the year under review experiments have been continued with a view to the production of a new type of half-inch map. It has been decided that it is in the interest of the public and of the Government Departments using the maps that the number of forms of half-inch maps should be reduced from two to one. The Board of Agriculture

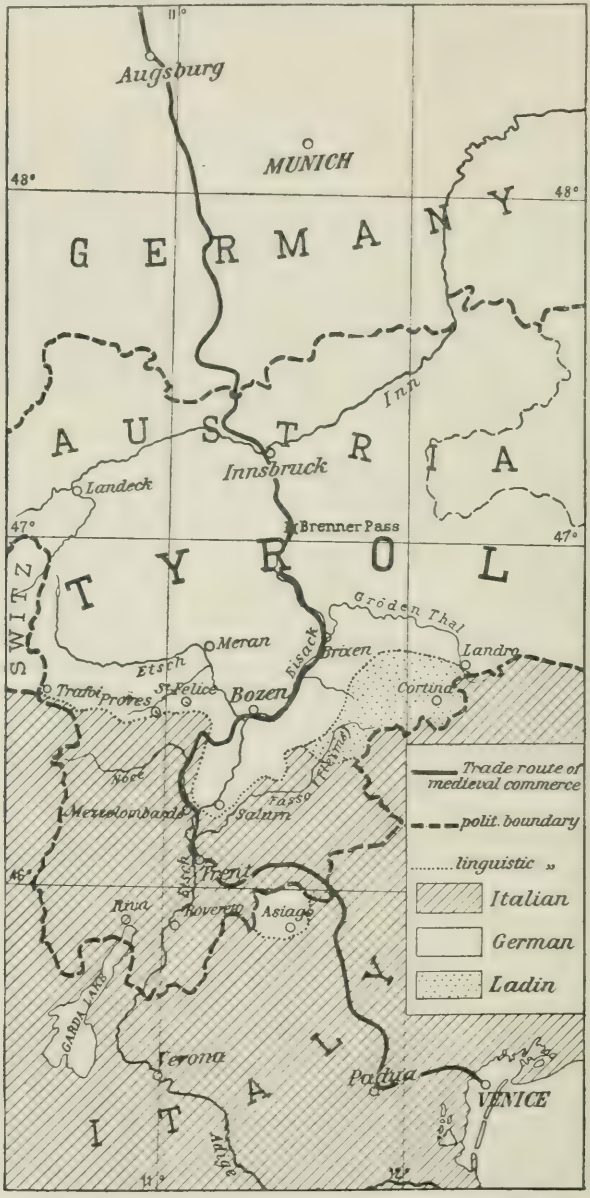
[1] *Land and Water*, 5th June 1915.

and Fisheries has decided that a type of half-inch map should be got out that shall combine the merits of both the layer and shaded system, in so far as this is possible. The type of map was approved by the President on February 2, 1915, and many sheets are on hand which will be published at an opportune season.

Another point of interest is connected with the records obtained from the Dunbar tidal gauge. For the twelve months ending April 1915, the mean sea-level was 13·099 ft. above observatory datum, as compared with 13·131 ft. for the corresponding period ending April 1914. The monthly levels at Dunbar in each year have an extreme range of variation of 1 ft., the means over the summer period—April to August inclusive—being nearly a $\frac{1}{2}$ foot lower than those over the winter period—October to February inclusive—but the variations in 1914-15 show greater regularity than those in 1913-14. The height of the local barometer may have some effect in producing these results, but it seems probable that change in the barometric gradient between the Shetlands and Iceland is the chief controlling factor.

Language and Nationality in Europe (*with Sketch-Map*).—Mr. Leon Dominian contributes to the June issue of the *Bulletin* of the American Geographical Society a long and instructive article entitled "Linguistic areas in Europe: their Boundaries and Political Significance," illustrated by a fine series of maps. The article considers in considerable detail the majority of the areas in continental Europe where two or more languages meet, and stresses in an interesting fashion the connection between the physical features of the surface and the distribution of the various languages. The paper is of special interest here in that it seems to be written entirely without emotional bias, and with a detachment impossible to those who have come into contact at close quarters with the bearing on human life of the facts so dispassionately set forth in the article. The paper is naturally too detailed to lend itself to the purpose of an abstract, but we reproduce here one of the sketch-maps which it contains, that showing a very interesting region where fighting is now going on between the Italians and Austrians. In commenting on this map the author points out that the German language in this district has followed the valleys of the Etsch (Adige) and Eisack, because these rivers mark the lines by which traders and their goods have travelled from the German highlands of Central Europe towards the Mediterranean. The Brenner Pass marks of course an old road leading from Augsburg, and thus Germany, to Venice and the Mediterranean. In detail we may note that Trafoi on the map marks the northern exit of the Stelvio Pass, and that here Italian, the Romonsch idioms of the Swiss Engadine, and the German of Tyrol all meet. Eastward of this point the language line between German and Italian runs along the watershed of the Etsch and Noce rivers. In much of the area shown on the map fighting is now going on, and those who are familiar with the region know that the present warfare is but the culmination of the seething unrest which has prevailed here for a long period. Further, it may be noted, a point upon which Mr. Dominian does not dwell, that

in the comparatively small tract in which Ladin is spoken, the people



Sketch-map of Austrian and Italian Tyrol and neighbouring regions (1914), to show political and linguistic boundaries.

are in theory, if not in practice, trilingual. In the home they speak Ladin, but the church services are carried on in Italian, and Italian is the

literary language, the instrument through which mental development is possible. But the administrative language, in which all communication between the people and their governors must be carried on, is German, the language of the schools. Nevertheless, men who have passed through years of schooling, and have done their military service, have the greatest possible difficulty in making even the simplest statement in German, a fact not without pathos and political importance.

Mr. Dominian's conclusion, which seems to err on the side of excessive simplification, is as follows :—" At present inhabitants of linguistic areas under alien rule are clamouring for the right to rule themselves. The carrying out of plebiscites under international supervision can be relied upon to satisfy their aspirations, and serve as a guide to frontier rearrangements. All told the growing coincidence of linguistic and political boundaries must be regarded as a normal development. It is a form of order evolved out of the chaos characterising the origin of human institutions. The delimitation of international frontiers is as necessary as the determination of administrative boundaries or city lines. Human organisation requires it, and there is no reason why it should not be undertaken with a fair sense of the wishes and the feelings of all affected."

America.

The Mountains of Alaska.—The American Alpine Club has published, as *Alpina Americana*, No. 3, a finely illustrated monograph on the mountain systems of Alaska, by Mr. Alfred H. Brooks, the chief of the division of Alaskan mineral resources of the United States Geological Survey. The pamphlet includes a good relief map of South Central Alaska, sketch-maps, and some fine illustrations from photographs showing mountain scenes.

In his description Mr. Brooks points out that Alaska is far from being wholly mountainous, and that further a much smaller proportion of the total area is covered by ice and permanent snow than is generally believed. The mountains fall into two groups, separated by a region where the inter-stream areas are generally flat, and which has been called in consequence the Central Plateau. This plateau region is throughout its vast extent devoid of permanent snow and of glaciers. Glaciation reaches its maximum in the southern of the two mountain belts, that called the Pacific mountain system. This system forms a great crescent skirting the seaboard of southern Alaska, and reaching a maximum width of about two hundred miles in the centre of the curve of the crescent. Within the system are included the Coast, St. Elias, Chugach, Aleutian and Alaska ranges, together with the Wrangell and Talkeetna mountains, and it is broken by many broad drainage basins and some lowlands. The region is one of high mean relief, with peaks ranging from 10,000 to 20,000 feet in height, contains active and extinct volcanoes, and displays the largest glaciers and snowfields in the western hemisphere except the ice-cap of Greenland.

Inland this Pacific system slopes down to the Central Plateau, already

mentioned, which to the north and east merges into the foothills of the second series of ranges, those forming the Rocky Mountain system of Alaska. This northern region has only been imperfectly explored. There seems to be a mountain belt about one hundred miles in width, composed of east-to-west trending ranges, varying from 4000 to 8000 feet in height. Here only a few small glaciers are known. The northernmost ranges fall off abruptly to a region of slight relief, the Arctic Slope of Alaska.

It will be obvious from the above description that it is in the Pacific system of mountains, and here alone, that is found the great development of glacier ice usually associated with Alaska. The magnificence of this scenery and its relative ease of access from the coast has led to an unconscious exaggeration of its total area. Mr. Brooks states that the snow and icefields of Alaska cover only an area of some 20,000 sq. miles, or less than four per cent. of the country. Further, not only are the glaciers virtually confined to the Pacific system, but even here they occur chiefly on the coastal slopes, only small glaciers being present on the inland slope. This distribution throws light on the causation of the intense but limited glaciation. It is obviously due to the effect of the warm, moisture-laden winds sweeping up from the Pacific. Beyond the coastal barrier the precipitation is small, so that extensive snowfields and glaciers are found inland only when the coastal ranges are low, or broad open valleys permit the sea winds to reach the interior without having lost their load of moisture. Thus Mr. Brooks states that the present heavy glaciation of a part of Alaska is a purely local phenomenon; the present glaciers are not to be regarded as remnants of the great North American ice-sheets. In the high ranges ice-cap glaciers occur. In other words there are large icefields, often uncrevassed, extending for many miles, showing little apparent movement except near the margin, and only broken by nunataks or ridges and peaks. The best example of this condition at present known is that seen in the Kenai peninsula, where there is a great dome of smooth ice, pierced only by a few peaks, extending over an area of between 800 and 1200 sq. miles, and breaking away into many valley glaciers at its margins. Elsewhere the glaciers are of the more usual valley type, save that the valleys are deeply buried in the ice flood. The largest masses of ice and snow seem to occur in the unexplored parts of the St. Elias Range, where there is a great sea of ice whose overflow pours through gaps and valleys to the ocean and to the Copper and Alsek rivers. This is the source of the great piedmont glaciers lying between Yakutat and Controller bays, of which the most familiar are the Malaspina and Bering glaciers. A detailed study of these ice masses would doubtless yield many interesting facts in regard to glacial phenomena generally.

Botanical Station at Jamaica.—According to an article which appears in *Nature* of June 17, a committee of the British Association has leased the Cinchona Station in the Blue Mountains, Jamaica, from the Jamaican Government, with a view to providing facilities for the study by qualified persons of a tropical flora on the spot. The Jamaican

Department of Agriculture has under its control no less than seven public gardens, of which three are botanic gardens in the strict sense. These three are the Hope Gardens near Kingston, the Castleton Garden, and the Cinchona Plantation or Hill Gardens, in the Blue Mountains. The last named are placed on one of the southern spurs of the Blue Mountains, at an altitude of 4000 feet. The direct air distance from Kingston is about 15 miles, but the distance by road is somewhat greater. From the gardens magnificent views are obtainable in every direction, and they contain a substantial dwelling-house, the building which is now let to the British Association Committee, and would be available for the use of scientific visitors. The house is furnished and kept in excellent repair, and there are sheds adjacent which could be used as laboratories. The climate of Cinchona is almost ideal, the annual mean temperature being 62° F., with a mean annual variation of only 12° F. The rainfall is heavy, but in summer comes mostly in heavy thunder showers which fall in the middle of the day, while the evenings are fresh and sunny. At one time, as the name suggests, the cultivation of cinchona trees was carried on on a large scale on the slopes round the gardens, but the trees have now practically all disappeared, and the hillsides are returning to their natural condition. Above the station, *i.e.* at heights exceeding 4000 feet, virgin forest extends up to the highest summits, and is remarkable for its wealth of ferns. In the neighbourhood there are many excellent collecting grounds. Further, the water supply is good, and as regards personal safety, comfort, cost of living and so forth, Jamaica compares favourably with any other station in the tropics. It is estimated that at an expenditure of less than one hundred pounds investigators could spend a summer vacation of seven to nine weeks in the study of a tropical flora under the favourable conditions described above. Applications for the use of the house, accompanied by suitable credentials, should be made to Professor Bower, University, Glasgow.

Earthquake Phenomena in Panama.—Dr. Donald MacDonald of the U.S. Geological Survey describes in *Science*, for May 28, some curious phenomena which he noted in Panama while engaged in studying the causation of earthquakes there in the autumn of 1913. During the month of October in that year earthquakes occurred almost daily in the Azuero Peninsula. At the time of the first and heaviest shock the telegraph cable from Panama to California up the western coast broke at a point where it passes over the submarine escarpment from the continental shelf at about 60 fathoms to the ocean depths at from 700 to 1000 fathoms. On the chart the distance from the 60 fathom sounding to the 784 fathom sounding is less than two miles, but it is not known whether the slope between these two points is uniform or not. Not only did the cable break, but it was found that for a distance of about half a mile it was buried in debris at the bottom of the ocean. This section had to be abandoned, and a new piece joined on. It is reported that in 1882-3 the cable was broken by an earthquake in almost the same locality. Dr. MacDonald is of opinion that the only explanation of these facts is that movement occurred along an old fault escarpment, or fault zone,

which marks the boundary between the continental shelf and the deep ocean basin, and that this movement was sufficiently great to cause the earthquake, which resulted in a submarine landslide. The cable must have been broken either by the jar of the movement along the line of fault, or by the subsequent submarine landslide.

Nearly all the later shocks of the series were accompanied by dull booming sounds, like the cracking of ice on large lakes owing to contraction in very cold weather. The author believes that these sounds were due to the formation of small shears or strain-relieving cracks in the rocks, perhaps at a considerable distance below the surface. Direct evidence of this was, however, not obtainable.

In one instance Dr. MacDonald was on the summit of a steep conical mountain peak, which stands about 2000 feet above the surface, at the time of a strong shock, and noted that the whole mountain seemed to sway, behaving like a stiff jelly. At the same time a dull heavy underground rending sound was heard, which began on the north-easterly to northerly side of the mountain and died away in the distance on the other side. The sounds had a terrifying effect on the inhabitants, who regarded them as precursors of a volcanic outburst.

General.

Obituary.—We regret to record the death of Mr. J. H. Guthrie, third son of Lord and Lady Guthrie, which occurred on July 10. He was educated at Edinburgh Academy and Merchiston, and as a young man went to Lovedale Institution with his tutor, the Rev. John Lennox. Of delicate health, he followed an open-air life, and engaged in sheep-farming in South Africa, in New Zealand, and latterly in the Langholm district of his native land. In 1903 he rendered valuable service to this Society in completing, after six months' labour, a catalogue of the Society's library, classified both under subjects and authors, in which he made over eight thousand entries.

Canadian Memorial to Hugh Miller.—A particularly interesting kind of memorial forms the subject of a letter from Sir Archibald Geikie, K.C.B., F.R.S., to *Nature* of July 1. The letter contains a quotation from a recent communication sent by Dr. John M. Clarke, director of the State Museum at Albany, N.Y., to Sir Archibald Geikie, in which Dr. Clarke says:—"You may be interested to know that at my urgent suggestion the Geographic Board of the Province of Quebec have adopted the name 'Hugh Miller Cliffs' for the wonderful Old Red Sandstone fish-beds which line Scaumenac Bay on the Bay Chaleur, near the Gulf of St. Lawrence. I think there is no place in the world where the fishes Hugh Miller described are so abundant." Sir Archibald Geikie adds:—"Geologists in this country will be pleased to hear of this Transatlantic recognition of Miller's pioneer work, and they will feel that Dr. Clarke, who is familiar with the classic Cromarty ground as well as with that of Scaumenac Bay, deserves our thanks for suggesting

this unusual but most appropriate memorial, and for his successful efforts to have it carried out."

Death of Lieut. R. B. Woosnam.—To the already long list of scientific workers who have lost their lives in the great war must be added the name of Lieut. R. B. Woosnam, known for his zoological explorations in various parts of the African continent. Lieut. Woosnam's name is especially associated with the British Museum expedition to Ruwenzori in 1905, of which he was the leader. The expedition reached a height of 16,794 ft. on the mountain, and obtained a number of new species, as well as extending generally our knowledge of the flora and fauna of tropical Africa. In 1911 Mr. Woosnam was appointed by the Secretary of State for the Colonies, game warden in British East Africa, and he was last year mainly responsible for the getting together of the International Conference for the Protection of Wild Animals which met in London. His hopes of seeing carried out the stringent rules adopted by this Conference have been frustrated by his death at the Dardanelles on June 4.

Earthquakes and the Barometric Gradient.—According to a note in *Nature*, various papers which have appeared at different times in the *Proceedings* of the Tokyo Mathematico-Physical Society confirm a suggestion originally made by Prof. Terada and Dr. Hasegawa in 1909 that the barometric gradient over a region subject to earthquakes is one of the contributory causes of their production. In one case in Japan it has been shown that when an earthquake occurs in a particular region the barometric gradient is perpendicular to the line of a certain geological fault, while during fifty slight earthquakes in another district the barometric gradients were nearly perpendicular to the line of seismic weakness as previously calculated by grouping the epicentres.

The Work of Waves.—Prof. Douglas W. Johnston and Mr. Warren S. Smith contribute to the *Popular Science Monthly* for June a descriptive account of three severe storms on the coast of New Jersey during the winter of 1913-14, which is illustrated by some striking photographs showing the effect of the waves. The part of the New Jersey coast which suffered most severely from these storms was the strip of coast south of Sandy Hook and north of Long Branch. There are here some small coastal towns built upon the narrow bar which is prolonged northwards into the spit of land forming Sandy Hook, and thus situated only a few feet above high-tide level. The winds during the storms reached a velocity exceeding in some cases 120 miles per hour, and as they were onshore winds, they drove tremendous waves shorewards with great velocity and disastrous results to property. The illustrations show different stages in the destruction of houses placed near the shore. As a general rule, while the protective works on the foreshore were destroyed by the direct impact of the waves, the houses fell owing to the undermining of their foundations. The paper emphasises the trifling geological importance of the phenomena described; the waves are already in some cases beginning to restore the shore pro-

file destroyed by the storms. On the other hand, the very considerable destruction of property emphasises the need for some form of general control of shore defences, for a breach made in the perhaps carelessly constructed defences of one man's property enables the sea to enter and destroy buildings sufficiently protected against a direct frontal attack. There is no evidence that any subsidence of the coast of New Jersey has been going on, as has been suggested by some geologists.

Personal.—Mr. J. B. Tyrell, of Toronto, was elected president of the Geological Section of the Royal Society of Canada, at its annual meeting held in Ottawa on May 25-7.

Commercial Geography.

Sericulture in Italy.—A recent Italian report, summarised in the *Journal* of the Royal Society of Arts, discusses the causation of the decline of silkworm rearing in Italy. The causes given are manifold. In the first place emigration from rural districts is leading to a rise in the price of labour, a very serious item in the industry. Again it is difficult to find markets for the cocoons at prices which yield a profit, and the peasantry in consequence prefer to devote themselves to crops more easily marketed. As additional causes are given Japanese competition, the increasing production of artificial silk, and the prevalence of disease among the caterpillars. The subject is one of very considerable interest, for it is well known that silk is a product only influenced to a minor degree—within certain limits—by climate, but markedly by social conditions. The most favourable conditions are found in a district where there is a large peasant population, for the labour required is generally supplied by the whole household, rather than exclusively by individuals. The absence of the tradition of care and patience makes it difficult to establish the industry in new countries, and its hold in the western part of the Old World has always been somewhat precarious.

It is interesting to note what are the products which in Italy are replacing silk. In Piedmont rice is more and more taking the place of the mulberry. In Emilia the vine is extending its territory at the expense of the mulberry, as are also sugar beet, the tomato, and garden produce generally. In Tuscany it is again the vine and garden produce which are being preferred, while in the provinces of Rome, the Abruzzi and Campania fruit is more profitable than mulberries for silk. Further south on the mainland, and in Sicily and Sardinia, it is again the vine whose area tends to increase. Various measures are suggested with a view to the stimulation of the silk industry, especially a more rational cultivation of the mulberry tree, but an industry whose chief requirement is a large supply of cheap labour must always have a precarious hold on the modern world.

EDUCATIONAL.

The Yorkshire Summer School of Geography.—In reference to our note on this subject which appears on p. 274 of the May issue of the

Magazine, we are informed by Dr. R. N. Rudmose Brown that the proposed summer school has been postponed until August 1916. The postponement has been rendered necessary owing to the small number of entries and the proposed lecturers' absorption in other duties, both facts directly related to the war.

NEW BOOKS.

EUROPE.

Joseph Pennell's Pictures in the Land of the Temples. Reproductions of a Series of Lithographs made by him in the Land of Temples, March-June 1913, *together with Impressions and Notes by the Artist.* London: William Heinemann, 1915.

This collection of pictures begins with illustrations of the famous buildings of Sicily, and after two views of Paestum passes on to Greece. Mr. Pennell was, he tells us, especially impressed with the Greek feeling for site in placing their temples and shrines so that they became a part of the landscape. This is well brought out in some of his drawings, but for the most part their interest is artistic and architectural rather than as illustrations of Mediterranean scenery.

Germany and Eastern Europe. By Lewis B. Namier, B.A. London: Duckworth and Co., 1915. *Price* 1*s.*

Mr. Namier of Balliol College, Oxford, regards the present war as the inevitable outcome of Germany's political association with Austria, and of the deep-rooted and secular antagonism between Teuton and Slav. He shows that the political vagaries of Wilhelm II. bear a tragical resemblance to the futile strivings of Napoleon III., and that as the latter was confronted with the problem of the rise of Germany, so the Kaiser is with that of the rise of Slavdom. Fortunately for us there is no Bismarck to direct German foreign policy, and his successors seem to have inherited his brutality without any of his shrewdness. The author's statement that "Hungary and Turkey shared with Prussia an anti-Slavonic interest" should have been limited to the "Magyars and Germans in Hungary," the remaining nationalities there being Slav or pro-Slav. The author is of opinion that Russia will never get true freedom till she has expelled from her bounds every one of the Germans who have so long exploited her. There are many interesting new ideas in this talented essay.

The Soul of Germany: A Twelve Years' Study of the People from Within, 1902-14. By Thomas F. A. Smith, Ph.D. London: Hutchinson and Co., 1915. *Price* 6*s. net.*

Many have written on Germany without much knowledge of it, but Dr. Smith speaks from lengthened experience as a lecturer to 125 German and Austrian Secondary State Schools, and as English Lecturer in the University of Erlangen. Although he never had any personal animosity to Germans, he became convinced, during at least eleven years of his stay, "that Germans look upon England as their inveterate enemy and hate her. That hate he met in *all* classes, mixed with the hope that 'the Day' would come when England would be broken and humiliated." The author exposes the mercenary character of German marriages, often arranged through business agencies, and states that in 1913 no fewer than 1880 marriages

were dissolved in Bavaria, although the Roman Catholic Church there is strongly opposed to divorce. In regard to education, "the young German does not obtain those qualities in his school which are the basis of true character, viz. the right respect for himself and reverence for God and goodness in other men. But, on the other hand, he has absorbed an element of poison in that he has learned to look upon a polite exterior as vital." At school Protestant and Catholic children look upon each other with suspicion, often mingled with contempt, while both learn to despise most heartily children of Hebrew parents. "The German Government does not wish any of its schools to teach self-reliance or independence of thought and action; it is no part of the school's duty to cultivate in the individual a conscience which is to become his king."

Germany easily holds the record for turning out "University men," there being 60,000 students at her universities. The German Government lately published a notice that there were enough university-trained teachers waiting for appointments to cover the demand for the next ten years. As a body German Professors are openly contemptuous and hostile both to the terms and spirit of religion. Many of them would gladly see "Faculties of Theology" swept from their universities. As a class they are bitterly Anglophobe. The German student "finds himself in an atmosphere of intellectual materialism from which religious and moral forces have been banished. In this world he soon discovers that, to be a hero, he must belong to the fighting, swaggering, drinking Don Juan class. He brings no sporting instincts from the school, and acquires none at the university."

The author mentions that in Germany ancient churches and cathedrals are renovated and new ones built with money gained by State lotteries. All Germans are registered either as Protestants, Catholics, or Jews, and pay a yearly tax to one of these confessions. "The educated German despises religion, but the working-classes are learning to hate it, if for no other reason than that it is a State religion, ergo, an essential part of the great tyranny which condemns them to civilised servitude." The Social Democrats (who polled 4,250,000 votes) object to marriage for several reasons, and they have twice as many votes as the Roman Catholic party. In Germany "the upper classes are intellectual materialists, and the lower ranks the victims of Germany's new religion—Social Democracy."

In these and several other chapters on the German National Character and Ideals, the Army, Nietzsche, Treitschke, the Reptile Press, the Kaiser, and Crime in the Army and Navy and under "Kultur," Dr. Smith brings a tremendous indictment against Germany, which his lengthened residence there enables him to support with facts and figures. His book is certainly one to be read.

The New Russia, from the White Sea to the Siberian Steppe. By ALAN LETHBRIDGE. London: Mills and Boon, 1915. *Price* 16*s. net.*

Books on Russia have been frequent since the war began, but this one takes us to portions of the vast empire which tourists rarely visit, such as Archangel and the White Sea, Viatka, Perm, Verchofuria and the Urals, Ekaterinburg, Tiumen, the head of the Siberian waterways, and Omsk and Cossack territory. It has ninety-five illustrations from photographs by the author, and three good maps. The author contradicts the popular idea that Archangel is a cold, unproductive region, by saying that "Archangel is seldom as cold as Moscow, while its summers are oftentimes unbearably hot. Save upon the littoral, the White Sea never freezes, and the great plain above the 58th parallel, except in the extreme north, supports a numerous population, possesses unlimited natural resources, and eventually will undoubtedly develop into a rich and prosperous section of the *Russian Land.*" Solovetz is the largest of a cluster of islands in the White Sea, approximately two

hundred miles north-west of Archangel, and the author and his wife visited its monastery last year. They stayed in an enormous guest-house, and were kindly received by the monks. From Solovetz they proceeded by steamer up the river Dwina to Veliki Ustjug, which resembles Florence in the richness and number of its churches, several dating from 1400, but the majority from the sixteenth century. The singing of a nuns' choir exceeded their most sanguine expectations. Viatka was reached by railway. Here they were made honorary members of its club, and, after witnessing a dance performed by the young men and maidens of the town, remarked, "The Russians are natural dancers; no amount of instruction could ever instil into a human being the inherent grace which is their birthright." At the same time, they also observed that "nowhere else in the world are to be found lads whose mentality matures as quickly as those of Russia," while "as for young Russian womanhood, it is even more eager to learn, more receptive, and more zealous than the other sex." One young lady of Viatka told them that her favourite book was Stevenson's *Dr. Jekyll and Mr. Hyde.*

From Viatka they reached Perm, and were again hospitably accommodated by the local club. They found that an anti-German feeling had permeated Russia for years, and that their being English assured them consideration. Crossing the Urals, our travellers arrived at Ekaterinburg, "a sort of miners' Paradise," possessing a strongly American go-ahead flavour, and "altogether foreign to the sleepy temperament of the European Russian." Ekaterinburg is the geographical centre of the Ural mining district, and seventy-five ironworks operated at a profit are within easy reach. It is proposed to make Ekaterinburg also a great railway centre, as the author shows on a special map. He went on to Omsk, a fine city in Siberia, which also "throbs with intense business activity." It lives chiefly upon its dairy produce, and exports annually 10,000 tons of butter, most of which goes to Britain, and is often retailed as Danish because it crosses Denmark. The outbreak of war brought this interesting tour to an end, and our friends took train to Vologda, "one of the pleasantest of little provincial Russian towns," and returned to England by steamer from Archangel. Everywhere in Russia they had met with the greatest kindness, and declare "we were received as guests of honour because we were English, and one and all, official and layman, noble and moujik, tried their best to show their appreciation of our presence."

Changing Germany. By CHARLES TOWER. London: T. Fisher Unwin, Ltd., 1915. *Price 7s. 6d. net.*

The change, Mr. Tower thinks, has taken place mainly in the last ten years. At the beginning of that time—he writes mainly of Berlin—life was simple, amusements inexpensive, hospitality ready. Swiftly these have given place to extravagance, laxity, debauchery. Individual responsibility has been dispensed with. The State is all in all. A significant illustration of the official temper was the ordinance of the Police President of Berlin, threatening with punishment and even with dismissal without pension any police officer who got shot by a rowdy through reluctance to shoot first. Naturally, many unarmed persons were shot down by the police. Responsibility to a Higher Power than the State has passed from the national ken.

The "Psalm of Hate" against this country broke forth in the first week of war, and, Mr. Tower tells us, was arranged and ordered by the authorities. At the same time fear entered largely into the matter, and that was not an element born only in the hour of crisis. "They hate us," said an Englishman to me soon after I first went to Germany, "as the sparrows hate a parroquet." The methods

intended to be employed against this country will be found on page 207, and they are as unscrupulous as they are ruthless.

We have possibly done injustice to Mr. Tower in the passages we have selected from his book. He does not write as an extremist, rather as a well-informed, well-balanced critic, fully sympathetic to German ideals. His indictment, therefore, carries the greater weight. The concluding chapter on the future of Germany "when the sleeper wakes" is worth attention.

ASIA.

Travels in the Mogul Empire, A.D. 1656-1668. By FRANÇOIS BERNIER. Translated and annotated by ARCHIBALD CONSTABLE. Second Edition revised by VINCENT A. SMITH. London: Humphrey Milford, 1914. *Price* 6*s. net.*

Mr. Archibald Constable's translation of Bernier's Travels was first published in 1891. Mr. Vincent Smith has revised his work and made numerous trifling alterations and emendations intended to increase the accuracy of the translation. The book, though it seems somewhat dear, is well printed and of a convenient and handy size, and has a number of illustrations and three reproductions of seventeenth-century maps.

The East I Know. By PAUL CLAUDEL. Translated by TERESA FRANCES and WILLIAM ROSE BENÉT. London: Humphrey Milford, 1914. *Price* 5*s.* 6*d. net.*

This volume, stated to be the first of M. Claudel's work to appear in English, includes an appreciation of the author by Pierre Chavannes, and consists of a series of word-pictures of eastern scenes. All such forms of composition, which depend for their effect upon a special use of words, and on the turn of the phrases, must necessarily lose greatly in translation, and we have not found in the book the charm which the introduction leads one to expect. It has little direct geographical value, though there are some striking descriptions of the scenery and buildings of the East. In the majority of cases, however, the localities are not stated.

Cyprus: A Short Account of its History and Present State. By Colonel A. O. GREEN. Kilmacolm: M. Graham Coltart, 1914. *Price* 2*s. net.*

We gather that the contents of this book have appeared—in whole or in part—in the pages of the *Northern British-Israel Review.* The journeys upon which much of the book was based were apparently undertaken in 1896, but quotations from the *Handbook of Cyprus* and other sources are also included in order to bring the subject-matter further up to date. Most geographical readers will probably be more interested in Colonel Green's descriptions of the scenery passed through than in "British-Israel Truth," but the latter subject also receives consideration. There are some good illustrations.

Aboriginal Siberia: A Study in Social Anthropology. By M. A. CZAPLICKA. With a Preface by R. R. MARETT. Oxford: At the Clarendon Press, 1914. *Price* 14*s. net.*

Until the publication of the memoirs of the Jesup North Pacific Expedition, those students who were interested in the social anthropology of the Siberian aborigines and who were unacquainted with the Russian language, had to rely exclusively on the older writers, such as Castrén, Müller, Steller and Pallas, and on incidental notices in books of travel or missionary enterprise. In her present work Miss Czaplicka has not only utilised these sources, but has drawn largely

upon the scientific literature of Russia which deals with the Siberian peoples. She has marshalled her materials in masterly fashion, and has produced a book the importance of which to those engaged in anthropological research it would be difficult to overrate.

The volume opens with an account of the geography of Siberia, and of its climate; and, in the following chapter, we find a new classification of its population which, as Mr. Marett points out in the preface which he has contributed, offers a working distinction of first-rate value. Of the three remaining parts into which the work is divided, one is allotted to sociology, one to religion, and one to pathology; and the concluding portion of the book contains biographical sketches of some of the most recent workers in the field, an admirable bibliography and glossary, and a serviceable index.

In Part II., which is headed "Sociology," the author deals with the social organisation of the population, tribe by tribe, their marriages, their customs and beliefs connected with birth, death, and burial, their views regarding the future life, and their worship of ancestors. Many interesting facts are presented regarding the constitution of early society, and of the various units of which it is composed—units which are founded sometimes on local contiguity, sometimes on family relationship, and sometimes even on community of occupation. It is interesting to note that even in a tribe such as the Koryak, in which the family is the only well-defined and stable social entity, the members of unrelated families fraternise with one another and mark their friendship by exchanging gifts—a practice which is also in use among their women. These artificial extensions of the group have been observed among many primitive peoples, as, for example, among the Yahgan of Cape Horn, the Khoi Khoin of South Africa, and the Oráon of India, and are perhaps most generally known in the form of artificial brotherhood, of which blood-brotherhood is the most familiar type. In some instances supplied by Miss Czaplicka blood-revenge not only plays an important part in the punishment of crime, but constitutes the tie between the related families which form the social unit. Respect for age is a characteristic of the Chukchee, and among the Yukaghir the "old man," who is generally the oldest man of the clan, directs the conduct of its daily life. He regulates war and expeditions for hunting and fishing, he selects the resting-places during the clan's wanderings, he leads in its sacrifices, presides at its festivals, and enforces obedience to its customs. So, too, among the Golyaks, the elders have a predominant influence in the decision of questions of cult and clanship. The Yukaghir hunter occupies a position of great importance. He has no special share in the game which he procures; but his communal instinct is so strong that because he is working "for the people of his own blood," to use his own expression, he spares no exertion to provide the necessary supply.

The author observes that in the Chukchee language there is no word for "girl," and seems to regard that fact as an item of evidence in support of the view that sex-relations before marriage are wholly unregulated. It may be remembered, however, that the character of the girls of the Abipones was above reproach; yet their language contained no word for virgin. It may be noted that Miss Czaplicka does not mention a statement by Eichwald that in former times the Samoyeds and Ostiaks, according to their own admission, killed and ate their old parents who had become unfit for work, in the expectation that by such a death they would fare better in the future life. There is evidence that such a practice existed among the Battaks of Sumatra, in Tibet, and among some of the wild tribes of Arakan, Siam, China, and India; and it would have been of interest to learn what the most recent investigators in Siberia have to say on this subject.

It seems ungracious when so much has been supplied to complain of omissions; but we do own to some surprise in finding so little information regarding trade customs—a matter which has been the subject of many notices by voyagers and others. An account is given of the Chukchee "trading-dance," which seems to have little enough to do with trade, and thus differs from the trading accompanied with dances which is found in New Caledonia, among some African tribes, and elsewhere. But, with the exception of that account, there does not appear to be any statement as to markets, barter, or other commercial usages.

The section on Religion supplies an elaborate and a most interesting account of the Shaman, his call to his vocation, his preparation for it, and his ceremonial performances.

One of the most curious chapters in the book is that which treats of the so-called "arctic hysteria." Under this heading the author deals with "voluntary death," which has established itself as a recognised practice among the Chukchees. Mature or old people are killed at their own request by some near relative, by stabbing, strangulation, or shooting; and the author observes that "only in this region is such an institution as 'voluntary death' looked upon as praiseworthy." There is, however, evidence to show that in the New Hebrides the aged were buried alive at their own request; and that it was considered a disgrace to the family of an aged chief if he did not die in this fashion. Indeed, there are many instances of the practice as prevalent in non-arctic regions.

We are grateful to Miss Czaplicka for the work: it is one of great value and interest; and we look forward to its continuation, as promised by her in her prefatory note.

Village and Town Life in China. By Y. K. Leong, LL.B., B.Sc., and L. K. Tao, B.Sc. London: George Allen and Unwin, Ltd. *Price 5s. net.*

This book is the work of two Chinese gentlemen, both of whom have taken their degrees in Economics in the University of London, and it is, so far as we can judge, an honest attempt to give a picture of social and family life in China, from the point of view of educated Chinese. The subdivision of the country into provinces, prefectures, and districts, and of authorities minutely graded down from the viceroy of a province as large as England, to the village elder who exercises patriarchal sway over his fellow-villagers, results in China becoming, in effect, "a huge republic within which are myriads of petty republics."

"Nominally it is governed by the central government through a hierarchical series of officials, . . . but actually, with the exception of paying a nominal land tax, and in a few other cases, the village is as independent of the central government as any British self-governing colony is independent of the Imperial Government."

The above is perfectly true, and there is much in the book that is valuable and interesting to the European student of sociology, but we venture to think that the writers emphasise, quite unconsciously, the wide difference which notoriously exists between theory and practice in Chinese life. For example, when we see it gravely stated that "police, education, public health, repairs of roads and canals, lighting, and innumerable other functions are managed by the villagers themselves," we rub our eyes and ask in wonder if this be China! For it needs but a brief acquaintance with town and village life in China (apart, perhaps, from some of the treaty-ports), to be convinced that most of these desirable public works are conspicuous by their absence. Rather is it brought home to one the truth of the scriptural saying that "the dark places of the earth are the abode of horrid cruelty"—unconscious cruelty much of it is, no doubt, and arising from

poverty and superstition, dirt and overcrowding, more than from design, but the cruelty is there nevertheless. Our authors have much to say of the position of woman in China, and no doubt the wife of the head of the family exercises great power in the ancestral home; but the lot of the inferior wives, where polygamy is practised, and of the sons' wives, is often a hard one, under the iron rule of the mother-in-law. Indeed, suicide is fairly common among young women of Chinese villages who wish to avoid marriage and the servitude which marriage entails. This, of course, is the darker side of the picture, but it is one which calls for emphasis in noticing a book which tends to depict the position of woman in China too much in *couleur de rose*.

The concluding chapters, though under the heading of Town Administration, deal with the popular aspect of Chinese Buddhism, and we recommend them to any who wish to have a brief account of the Buddhistic cult amongst the Chinese.

We may point out that in speaking of the great collection of books in the library of the Hanlin Academy at Peking (p. 77), it would have been better to state, in a book purporting to be up to date, that the great Hanlin library was burned fifteen years ago, during the siege of the Legations.

Home University Library: The Ancient East. By D. G. Hogarth. London: Williams and Norgate, 1915. *Price* 1*s. net.*

Mr. Hogarth's name is sufficient guarantee of the excellence of the little volume. Within the limited compass it would be impossible to present a full account, and the author has hit on the original idea of "looking out at intervals." The result is that we obtain a much more clear impression than we could have obtained from a detailed continuous narrative. The wide, comprehensive views of causes and effects accentuate the clean-cut outline; all unnecessary retarding or blurring details are omitted; and everywhere Mr. Hogarth brings out in high relief the influence of geography on events. In such a masterly sketch it seems irrelevant to single out chapters, but we wish to call special attention to those which deal with Greece and Persia and to the epilogue on the results of Alexander's conquests and the relations of East and West.

AFRICA.

Lodges in the Wilderness. By W. C. Scully. London: Herbert Jenkins, Ltd., 1915. *Price* 5*s. net.*

Remembering Mr. Scully's racy reminiscences of South African pioneer life one turns with interest to the present volume. We are met, however, by something quite different. It is a description of a series of trips, partly on official business, partly for hunting, through the Bushmanland Desert, which is the portion of the Kalahari south of the Orange River. The book is opportune, for it deals with conditions exactly similar to those experienced by the victorious forces under General Botha. Reading of the difficulties and dangers experienced by quite a small party from thirst, transport troubles, and liability to going astray, one can only marvel at the organisation by which General Botha converted a hazardous expedition into a triumphal progress. Mr. Scully tells us much of the topography, climate, flora and fauna, and describes the few surviving nomadic inhabitants. There are four excellent reproductions of water-colour drawings by Mr. A. W. Standen. It seems almost ungracious to add that the author, in abandoning his accustomed breezy style, has strayed into the flowery but treacherous path of fine writing, but the remark is made in order to express the hope that the abandonment is only temporary.

AUSTRALASIA.

The Conquest of Mount Cook and other Climbs: An Account of Four Seasons Mountaineering in the Southern Alps of New Zealand. By FREDA DU FAUR London: George Allen and Unwin, Ltd., 1915. *Price* 16*s. net.*

Handsomely produced and lavishly illustrated by an exceptionally successful series of photographs, this book is a worthy addition to the growing library of literature dealing with the New Zealand Alps. Miss du Faur is an Australian who, living in the bush, was accustomed to going about alone and to scrambling over rocky ground. On a visit to the exhibition at Christchurch in 1906 she saw a photograph of Mount Cook, decided to see it for herself, and then and there made up her mind to become a mountaineer. Subsequent visits increased her enthusiasm, and, after a due period of apprenticeship and training on small expeditions, she was the first woman to set foot on the summit of Mount Cook. At a later date she made the first traverses by any party of Mounts Cook and Sefton, and made a large number of other interesting ascents. Throughout she acknowledges her obligations to her guides, and particularly to Peter and Alexander Graham: but there is ample evidence that she was a remarkably efficient climber, surefooted and self-reliant. The author admits regretfully that, her experience being confined to New Zealand, she has no standard of comparison, but quotes Alpine Club authority to the effect that the Mount Cook ridge she traversed is at least as difficult as the Teufelsgrat of the Täschhorn. We cordially commend this book to those fond of adventure-tales as well as to the mountaineer.

EDUCATIONAL.

Black's Travel Pictures: The British Empire. Selected and edited by ROBERT J. FINCH. London: A. and C. Black, 1915. *Price* 10*d. each set of twelve.*

An interesting set of forty-eight pictures, coloured and uncoloured, illustrating the scenery, products, native races, etc., of the different parts of the Empire, with explanatory notes and questions. The coloured pictures are often somewhat "woolly," but there are some fine photographs.

An Atlas of Economic Geography. By J. G. BARTHOLOMEW, with Introduction by L. W. LYDE. London: Oxford University Press, 1914. *Price* 5*s. net.*

This is a fine atlas, very moderately priced in view of its series of 64 plates, upon which Mr. Lyde's Introduction affords a running commentary. In addition to the maps dealing with economic geography in the limited sense, there are a number of others devoted to various aspects of physical geography, and some excellent orographical maps of continents and countries. Our chief criticism is that some of the maps seem to err on the side of over-conscientiousness, for they include more facts than can always be clearly shown, or than the average student using the map is likely to be able to digest. For example, the excellent orographical map of Central Europe shows railways, rivers, and the chief canals, all in black. We find in some instances that the canals are difficult to distinguish, this being notably the case with the Canal du Midi. As regards the railways the scale of the map renders it impossible to show the relation of their course to the surface features, and thus while theoretically their presence is an advantage in a physical map, we doubt whether practically they are of much use. The great routes which cross the Alps have the air of piercing the chain at a spot selected by chance, and we doubt whether any one not acquainted with the actual lie of

the land could, for example, perceive that the Brenner route is relatively so easy that no great tunnel is there necessary, as contrasted with the other routes. Under such circumstances it seems to us that it might be better either to omit the railways, or at least to leave them faint, since they do not illustrate the point which alone can justify their presence on an orographical map.

But if the maps seem sometimes to err on the side of an excess of detail, the Introduction is perhaps lacking in this respect. It is, as we would expect from Professor Lyde, full of suggestiveness, of vivid statements, of sudden turns of phrase likely to arrest attention, but it is a commentary on rather than an explanation of the maps. The teacher will probably find it wise to insist upon the scholar first studying the maps with the help of his text-books, and then taking the relevant sections of the Introduction as a *bonne bouche*.

The atlas will doubtless have a wide sale, which it well deserves.

BOOKS RECEIVED.

The Atlas Geographies: A New Visual Atlas and Geography Combined. Part III. Senior Geography, No. 3 Asia. By THOMAS FRANKLIN and E. D. GRIFFITHS, B.Sc., F.R.G.S., F.C.S. 4to. Pp. 84. *Price* 1*s.* 10*d. net.* Edinburgh: W. and A. K. Johnston, Ltd., 1915.

Roumania and the Great War. By R. W. SETON WATSON, D.Litt. Demy 8vo. Pp. 102. *Price* 2*s. net.* London: Constable and Co., Ltd., 1915.

The Partitions of Poland. By Lord EVERSLEY. With Illustrations and 4 Maps. Demy 8vo. Pp. 328. *Price* 7*s.* 6*d. net.* London: T. Fisher Unwin, Ltd., 1915.

America and Her Problems. By PAUL H. B. D'ESTOURNELLES DE CONSTANT. Cr. 8vo. Pp. xxii + 545. *Price* 8*s.* 6*d. net.* London: Macmillan and Co., 1915.

The Beothucks or Red Indians, The Aboriginal Inhabitants of Newfoundland. By JAMES P. HOWLEY, F.G.S. Royal 4to. Pp. xx + 348. Plates xv-xxviii. *Price* 21*s. net.* Cambridge: University Press, 1915.

Lowland Scotch, as Spoken in the Lower Strathearn District of Perthshire. By Sir JAMES WILSON, K.C.S.I., M.A. (Edin.). With a Foreword by W. A. CRAIGIE, M.A., LL.D. Small Royal. Pp. 276. *Price* 5*s. net.* Oxford: University Press, 1915.

Republica Argentina, Annuario del Instituto Geográfica Militar. 3er volumen. Buenos Aires, 1914.

Report of the Ordnance Survey to the 31st March 1915. London, 1915.

Report for the Year 1914-15 *on the Royal Scottish Museum, Edinburgh.* By the Director, Sir T. CARLAW MARTIN, LL.D., F.R.S.E. London, 1915.

Report on the Administration of Bihar and Orissa for 1913-14. Patna, 1915.

Publishers forwarding books for review will greatly oblige by marking the price *in clear figures, especially in the case of foreign books.*

NEW MAPS.

EUROPE.

ORDNANCE SURVEY OF SCOTLAND.—The following publications were issued between 1st July 1914 and 31st March 1915:—

Six-inch and Larger Scale Maps.—Six-inch Maps (Revised), with contours in

red. Price 1s. each. *Lanarkshire.*—1 NW., SW.; 2 NE., SE.; 3 NE.; 4 SW.; 7 NE.; 8 NE.; 13 SE.; 14 SW.; 16 SW.; 17 NE. *Renfrewshire.*—8 SW.; 15 NE.; 16 SW.

Note.—The unrevised impressions of these sheets have been withdrawn from sale.

1 : 2500 Scale Maps (Revised), with houses stippled, and with areas. Price 3s. each. *Edinburghshire.*—Sheets I. (5 and 1); Edition of 1908, IV. 16. *Fife and Kinross.*—Sheets I. (11 and 12); III. 8 (9 and 10), 12, 13, 14; IV. 2, 3, 8, 13; VI. (4 and IIIa. 16), (6 and 5), (7 and 3), 10, 14, 15, 16; VII. 1, 2, 4, 7, 11, 12, 13, 14, 15, 16; VIII. 2, 5, 13, 14; XI. 12, 13, 15, 16; XII. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16; XIII. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16; XIV. 1, 2, 3, 5, 6, 7, 9, 10, 13, 14, 15; XV. 6, 9, 11, 14, 15, 16; XVI. (1 and 2), 13. 14, 15; XVII. 3, 6, 7, 8, 9, 10, 12, 13; XVIII. 4, 7, 10, 11, 12, 15, 16; XIX. 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16; XX. 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 13, 14; XXI. 9, 10, 11, 13; XXII. 7, 8, 16; XXIII. 5; XXIV. 16; XXV. 3, 7, 10, 13, 16; XXVI. 3, 6, 7, 8, 11, 12; XXVII. 1, 2, 3, 4, 5, 6, 7, 8, 12, 13, 14, 15, 16; XXVIII. 1, 2, 5, 6, 7, 9, 10, 12, 13; XXIX. (1 and 5); XXX. (2 and 3); XXXII. (11 and 10), 16; XXXIII. 6; XXXV. 2, 3, 4, 5, 6, 7, 9, 10, 11, 13, 14, 15, 16; XXXVI. 1, (2 and 6); XXXVII. 2, 3, 4, 6, 10; XXXVIII. 2, 8, 13, 14, 15; XXXIX. 6, 16; XL. 1, 2, 3, 4, 5, 6, 7, 9, 13; XLII. 4; XLIII. 3. Sheets VI. (9 and 13); X. (16 and 15); XI. 11, 14; XVII. (2 and 1), 5; XXV. 1, 5; XXXII. 7; XXXVII. 1. Price 1s. 6d. each. *Haddingtonshire.*—Sheet VIII. 16. *Stirlingshire.*—Sheets XVIII. 5, 6, (11 and 7).

Note.—There are no coloured editions of these sheets.

ADMIRALTY CHARTS, SCOTLAND.

The North Sea, Northern Sheet. New Chart compiled from latest British and Foreign Surveys. 1915. No. 2182c. Price 4s.

River Tay. Corrections to 1915. Scale 1 : 24,150. No. 1481. Price 3s.

Cromarty Firth Anchorage. Corrections to 1915. Scale 1 : 18,500. No. 3110. Price 4s.

Colonsay and Oronsay. Corrections to 1915. Scale 1 : 24,430. No. 2418. Price 3s.

Orkney Islands, Deer Sound and Approaches. New Chart, 1915. Scales 1 : 12,520 and 1 : 25,000. No. 2583. Price 3s.

Admiralty Office, London.

BARTHOLOMEW'S HALF-INCH TO MILE MAP OF SCOTLAND.

Sheet 7, Glasgow and Clyde District. Orographical colouring. New Edition, 1915.

Sheet 17, Aberdeen and Deeside District. Orographical colouring. New Edition, 1915. Price 1s. net; or mounted on cloth, 2s. net.

John Bartholomew and Co., Edinburgh.

ALDERSHOT CAMP DISTRICT.—Touring Map by J. Bartholomew, F.R.G.S. Scale half an inch to a mile. Orographical colouring. 1915. Price 1s. net; mounted on cloth, 2s. net. *John Bartholomew and Co., Edinburgh.*

ITALY.—Mappa della Campagna Romana del 1547 di Eufrosino della Volpaia. Riprodotta dall 'Unico Esemplare esistente nella Biblioteca Vaticana, con introduzione di Thomas Ashby. 1914. *Danesi, Roma.*

This is a facsimile reproduction of a most interesting old map, with commentary by Mr. Ashby.

EUROPEAN WAR MAPS.

Bartholomew's War Map of Italy and the Balkan States.—Scale 1 : 2,000,000, or 31·5 English miles to one inch. 1915. Price 1s., or mounted on cloth, 2s. 6d. net. *John Bartholomew and Co., Edinburgh.*

Carte murale du Théâtre de la Guerre Européenne (Front occidental et Front oriental) avec l'emplacement des Camps de prisonniers de guerre en Allemagne et un carton spécial : Adriatique et Balkans. Par P. Vidal de la Blache, membre de l'Institut, Professeur à l'Université de Paris. Scale 1 : 1,500,000. Prix 4 fr. 1915. *Librairie Armand Colin, Paris.*

"Daily Telegraph" War Map No. 8.—Showing the Italian and Austro-German Fighting Areas. Scale 10 miles to an inch. By Alex. Gross. Price 1s. 1915. *"Geographia," Ltd., London.*

The Western War Area.—From the Seine to the Rhine and from the Swiss Frontier to the Rhine Delta. Oxford Wall Maps, edited by A. J. Herbertson, M.A., compiled by the Editor and H. O. Beckit. 1915. Size 60 × 60 inches. Scale 1 : 5,000,000, or 8 miles to an inch. With contour lines and layered colouring. Prices :—

With names of towns, railways, etc. 12s. 6d. paper ; 15s. cloth ; 17s. 6d. rollers varnished.

Without names of towns, railways, etc. 10s. 6d. paper ; 12s. 6d. cloth ; 15s. rollers varnished. *The Clarendon Press, Oxford.*

Stanford's War Map, No. 12.—The Theatre of War in Western Asia Minor, the Sea of Marmora, the Bosporus and Dardanelles, Constantinople and Smyrna. 1915. Price 3s.

Stanford's War Map, No. 13.—The Seat of War in the Dardanelles and the Bosporus, embracing the country from Adrianople to Constantinople. Scale 1 : 383,000, or 6 miles to an inch. 1915. Price 5s. Mounted in case, 8s. 6d.

Stanford's War Map, No. 14.—The Seat of War on the Austro-Italian Frontier. Scale 1 : 1,140,000. 1915. Price 4s. Mounted in case, 6s. 6d. *Edward Stanford, Ltd., London.*

EUROPE, INTERNATIONAL MAP.—Scale 1 : 1,000,000 or 15·78 miles to an inch. The following new sheets are issued, 1915 :—

North O 29. The Hebrides. (*Ord. Survey, Southampton.*)

„ O 30. Scotland, The Highlands. (*Ord. Survey, Southampton.*)

Nord L 31. Lyon. (*Service Géogr. de l'Armée, Paris.*)

North L 34. Budapest. (*Magyar Fold. Intezet, Budapest.*)

Norte J 30. Valencia. (*Institutio Geogr. y Estad., Madrid.*)

Presented by Colonel C. F. Close, C.M.C., R.E.

These separate and independent attempts to realise and conform to the specified scheme laid down by the International Committee are interesting as a competition in national cartography.

AMERICA AND AFRICA.

MANITOBA, SASKATCHEWAN AND SOUTHERN ALBERTA.—Maps showing Disposition of Lands. Corrected to January 1915. Scale 1 : 792,000 or 12½ miles to an inch. J. E. Chalifour, Chief Geographer. 3 sheets. *Department of the Interior, Ottawa.*

UNITED STATES GEOLOGICAL SURVEY.—Geologic Atlas Folios. 1914. No. 190, Niagara, New York ; No. 191, Raritan, New Jersey ; No. 192, Eastport,

Maine; No. 193, San Francisco, California; No. 194, Van Horn, Texas. George Otis Smith, Director.

United States Geological Survey, Washington, D.C.

SOUTH-WEST AFRICA (formerly German). Showing Railways, Roads, Military Stations, etc. Scale 30 miles to an inch. 1915. Price 1s. 1d.

Offices of "South Africa," London.

KAFFRARIA. Map of the Diocese of St. John's. Scale 8 miles to an inch. Showing all Mission Stations, Railways, Roads, Bridle Paths, and Bridges. 1915. Drawn by J. Bartholomew and Co., Edinburgh.

Offices of the Scottish Episcopal Church, Edinburgh.

EDUCATIONAL AND GENERAL.

WORLD.—Bacon's Sixpenny Contour Atlas. Cr. 4to. 36 maps. 1915. The Midlands Edition. Price 6d. net. *G. W. Bacon and Co., Ltd., London.*

PHILIP'S SYNTHETIC MAPS.—By E. G. R. Taylor, B.Sc. Consisting of eight transparencies and two coloured foundation maps, with suggestions for class use. A series of eight sets of maps in packets. Price 6d. net for each set. 1915.

1. The World.
2. British Isles.
3. Europe.
4. Asia.
5. Africa.
6. North America.
7. South America.
8. Australasia.

George Philip and Son, Ltd., London.

These maps are ingeniously devised for illustrating the various geographical aspects of each region. The two foundation maps show separately the relief of land and the density of population, and on either of these may be superimposed the tracings showing special features, such as political divisions, communications, minerals, winter and summer climate, natural vegetation and January and July temperature. They are clear and simple, and admirably adapted for teaching.

PHILIP'S COMPARATIVE WALL ATLASES.—Edited by J. F. Unstead, M.A., D.Sc., and E. G. R. Taylor, B.Sc. With Explanatory Handbook for Teachers. 1915. Price 27s. 6d. each series, mounted on cloth.

Australasia.—A series of eight maps showing—1. Relief of Land and Communications; 2. Pacific Ocean, Physical, Political and Communications; 3. Summer Climate, Rainfall, Isobars and Winds; 4. Winter Climate, Rainfall, Isobars and Winds; 5. Temperature; 6. Vegetation; 7. Economic and Political; 8. Population and Exploration.—Size of each map, 43 by 33 inches. *George Philip and Son, Ltd., London.*

The Australasia series completes this valuable set of Wall Atlases, which we have already commended for their general excellence in completeness and graphic clearness.

BACON'S PHYSICAL WALL ATLAS OF INDIA.—A series of eight wall maps on scale of 1 : 5,000,000. 1915. 1. Contours; 2. Mean Annual Rainfall; 3. Seasonal Rainfall, May to November; 4. Seasonal Rainfall, December to April; 5. January Isotherms; 6. July Isotherms; 7. Vegetation; 8. Commercial. Size of each map 40 by 32 inches. Prices, 24s. cloth on one roller; cloth, cut to fold, with metal eyelets, in box, 29s.

G. W. Bacon and Co., Ltd., London.

For a summary of the physical geography of India these maps are admirable. They appear to be thoroughly up to date, and embody the latest material with graphic effect.

THE SCOTTISH GEOGRAPHICAL MAGAZINE.

THE ECONOMIC GEOGRAPHY OF JAPAN[1]

By Professor K. Oseki.

Preliminary.—The social and geographical nucleus of the Japanese Empire lies in the three large islands, Honshiu, Shikoku, and Kiushiu. The area which borders the Inland Sea of Japan—"Setouchi"—is renowned in history as the region within which the greatest acts of the national drama have been played, and which contains many relics associated with the memory of the founders and builders of the Empire. It is here, where settlement is oldest and the population densest, that we are confronted with the most difficult economic problems. Beyond lies the zone of territory acquired during historic times, where the social and economic problems are somewhat different and less critical.

Introduction.—The Japanese were, so far as we know, a civilised people in very ancient times, and there is no evidence, such as we find in the history of other nations, to show that our ancestors were once a very primitive people. It is, however, probable that the race passed through the infant stage common to all humanity in the very remote past; for our written history, which begins some two thousand years ago, shows that even then the Japanese were in a comparatively advanced state of civilisation.

They were primarily an agricultural people, and traces of the early influence of Korea and China may be detected in the development of the idea of the care of the land, an idea which, in its fullest meaning, exalts the calling of the farmer—but not his social status, which remains that of a peasant—to the first rank of importance, so that it controls, and has always controlled, the policy of Japanese statesmen. In fact, the agri-

[1] I have to acknowledge the kind assistance rendered me by Miss M. K. Heslop, M.Sc. in connection with the composition of this paper.—K. O.

cultural returns amount to about fifty per cent. of the total value of Japanese products, as will be shown later.

In earlier times, farmers living near the coast caught a few fish occasionally for their own use, but there seem to have been no fishermen pure and simple. Now, however, conditions are greatly changed, and the peculiarly favourable circumstances of Japan, with its insular position and extensive inland waters, are so fully utilised as to make it one of the foremost fishing countries of the world. Forestry too, which used to be another subsidiary occupation of the farmer, tends to develop as a separate activity, and as the area under forest is exceedingly large, there is probably a future for the industry. Ranching and poultry-rearing are practically in their infancy, being always auxiliary to agriculture. The keeping of stock was somewhat neglected in the past partly because the eating of the flesh of domestic animals was discouraged by religious teaching, which regards these creatures as somewhat near relatives of humanity, and demands that kindness and consideration be shown them in return for their many services; but horses and cattle have always been used for farm work and for transport.

Japan has considerable mineral wealth, the most important items being gold, copper, and coal. Gold especially was worked in very ancient times, and was used extravagantly by the people, as Marco Polo, the Italian explorer of the thirteenth century, mentions in his book. Japanese coal finds a ready market in Pacific and Indian Ocean ports, and, like copper, it often travels even further.

Those of the arts, crafts, and industries are most advanced which came under the early influence of Korea and China, but it is noticeable that this influence never ousted the characteristic Japanese taste and design, nor did it graft a foreign style on the native one. The textile industry, though very old, still keeps its importance, even beside such important activities as engineering and shipbuilding on a large scale, iron and steel works, locomotive factories, etc., whose surprising development during the last twenty years has done more than anything else to bring about the industrial conditions which we find in the Japan of to-day. Such goods as food and articles of clothing, and most of the common necessaries of life, are made in Japan, often from native raw materials, not only for home use but also to supply the markets of the Far East.

The earliest commercial transactions of the Japanese, like those of other nations, consisted in a system of barter, which seems to have been replaced at quite an early date by an exchange for money. Such transactions took place in recognised markets—indeed markets still maintain their importance, especially in the country towns, as the chief centres of trade.

Japan was first opened to foreign countries about half a century ago. Before that it had led an isolated life except for temporary communication with Europe in the sixteenth and seventeenth centuries, and also an intimate but variable intercourse with Korea and China lasting through many years. Since 1866 foreign trade has advanced prodigiously, and is increasing every year. It involves commercial relations with Europe,

America, and Australia, as well as with eastern and southern Asia, and with the Malay archipelago.

Although the surface of the country is very uneven, and a great hindrance to internal communication, there is, nevertheless, much traffic along the net-work of roads which penetrate into the interior, and also along the 6000 odd miles of railway in the main part of Japan, not to mention the lines in Karafuto (Sakhalien), Taiwan (Formosa) and Chosen (Korea).

The Japanese are by nature expert sailors, and navigate their coasts or sail the high seas with all the skill inherited from a seafaring ancestry. We have advanced with the times, however, and have been careful to adapt our shipping to the needs of modern civilisation, so that now we, the Japanese, compete with western firms both as carriers and as merchants, not only in the Pacific and some parts of the Indian Ocean, but also to a certain extent in the Atlantic and the Mediterranean.

Our material prosperity owes something in the past to Chinese and Korean influence, and to European culture in recent years. The Japanese Restoration in 1868 marks a new epoch in the history of the country, when great changes in industry and, to some degree, in thought, begin to make their appearance. But we may seek the real cause of the modern empire in the two great wars which ushered in the new century, and with it a new era for Japan—the Sino-Japanese war of 1894-5, and the Russo-Japanese war of 1904-5. By the Japanese Restoration, social conditions have been so far changed that the former division of society into two distinct classes, the nobles and the working class, has quite disappeared, and we find in its stead one great class of workers, organised by the courage and the wisdom of the late Meiji Emperor, to whom modern Japan owes a tremendous debt of gratitude.

The surprising increase of population (which statistics show to be proceeding at a rate which would double the number of inhabitants in the islands in seventy-two years) adds to the complexity of the social problem with which Japanese economists are now confronted—that of providing work and food for annually increasing numbers of people. The country is distinctly hampered by a lack of the raw material for some of its most important industries; for instance, we have to import raw cotton, wool and iron at a fairly high price. In short, Japan is now labouring under the economic disadvantage of a double pressure; from within comes the imperative need to expand caused by an increasing population; from without is felt the compressing force of political and commercial competition.

Agriculture.

General view of climate and surface.—In a country like Japan, which stretches through 29 degrees of latitude, there is necessarily a great range of climate and a corresponding variety of vegetable products. Climate then is the first controlling factor to be considered in dealing with the agricultural activities in the islands. In sub-tropical districts, such as

Taiwan (Formosa), the Riu Kiu (Loo Choo), and Bonin Islands, and the southern parts of the main islands, sugar cane is grown; the silkworm is reared in the drier inland parts of the middle latitudes; while further north we find potatoes, apples, etc.

The singularly favourable conditions of temperature and moisture which prevail through almost the whole country permit of a great variety of agricultural produce even in one locality, except in the north where vegetation is necessarily more restricted.

The temperatures are so moderate, and the climate generally is so mild, that farmers can work in their fields all the year round, and thus the land can be made to yield two crops annually: after the rice harvest in September or October wheat or barley is sown and is reaped the following May. From this it follows that the rate of production is high, requiring much labour, so that the rural population is, in consequence, fairly dense. The mountainous nature of the country, too, helps to crowd the agricultural settlements together on the few plains and the lower plateaux, though they are being forced up the hillsides and lower mountain slopes in those districts where civilisation is oldest and the social and economic conditions are most strained; for example, in Kinki, Chiugoku, Shikoku, Kiushiu, Tokaido, and the south coast region of Honshiu.

If we exclude Karafuto (Sakhalien), Taiwan (Formosa), and Chosen (Korea), only about 26·5 per cent. of the surface has a slope of less than 15 degrees, while even in the Kwanto region, which includes the Kwanto plain, the largest stretch of level land in the islands, only 30·8 per cent. of the surface satisfies this condition. On the peneplain of Chingoku, only 23·9 per cent. of the southern slopes which face the Inland Sea (Setouchi) are under 15 degrees, while to the north of the watershed only 17·9 per cent. fall to this relatively low angle.

Of the whole surface of the country then, only 26·5 per cent. is, from topographical considerations, available for agriculture, and of this area only about 52 per cent. has, up to the present, been brought under cultivation. In Kiushiu quite 80 per cent. of the cultivable land is already under crops, so that there is not much scope for further development in that island. On the other hand, the O-u districts, lying in the north of Honshiu, have only about 47 per cent. of their lowlands under treatment, so that there is—theoretically, at least—room for further expansion there.

Full statistics for Taiwan (Formosa), Karafuto (Sakhalien), and Chosen (Korea), are not yet published, but it is roughly estimated that even in Taiwan, with its fairly extensive plains, there is not more than about a quarter of the surface of sufficiently low gradient to repay cultivation.

Karafuto, too, is very mountainous, but there is a stretch of level country between the eastern and western ranges; the valley of the river Poronai, however, the largest plain in Sakhalien, is a vast tundra, useless for agriculture. Korea has, perhaps, a smaller extent of lowland than any other part of the empire.

Soils, etc.—It may readily be understood that such a surface is poor

in alluvial soils. Although weathering proceeds at a great rate on the uplands, there is but a shallow deposit of alluvium on the few lowlands which we possess, for neither the slope of the land nor the heavy rainfall permit of the accumulation of detritus to any great extent.

Volcanic materials, either in their original form or redistributed by water, cover a large part of the surface—for example, the vast extent of upland and the low tableland of northern Japan consist of the marine volcanic facies of the Tertiary system. Early Quaternary times were also apparently disturbed by several volcanic outbursts, as we find a considerable amount of erupted material in several parts of Japan at that horizon—indeed the older Quaternary deposits may often be subdivided into a lower series with pumice and an upper set with ash beds. While these undoubtedly furnish the most important soils, they are too highly siliceous to be really satisfactory unless mixed with another soil or with suitable manures. The broken-up surfaces of the Archæan, Palæozoic, and Mesozoic rocks exposed in the highlands furnish soils of limited extent and small value often lying on densely wooded slopes.

Granitic soils deserve special mention as those most suitable for rice. Although the disintegrated granite yields a soil which consists largely of granular silica, the felspar decomposes into a fine impermeable clay which is washed down into the subsoil, where it holds up the water near enough to the surface to be highly convenient for rice-growing.

The following table shows the percentage of the total area of the main islands occupied by the several formations:—

The Gneiss system occupies	2·372	per cent. of the surface
The "Crystalline system" (*i.e.* Schistose rocks younger than Gneiss) occupies	1·675	,, ,,
The Palæozoic group occupies	14·114	,, ,,
The Mesozoic group occupies	8·444	,, ,,
The Tertiary system occupies	19·478	,, ,,
The Older Quaternary (diluvial series) occupies	6·842	,, ,,
The Newer Quaternary (alluvial series) occupies	13·744	,, ,,
Granite and other plutonic rocks occupy	10·821	,, ,,
Volcanic rocks occupy	20·816	,, ,,

In the main islands of Japan—Honshiu, Shikoku, Kiushiu, and Hokkaido—we find that from climatic, topographic and geological considerations, as well as for economic reasons, a very small area—only 14·24 per cent. of the surface according to the statistics of 1907—is actually cultivated. Additional land might be given to the farmer from districts now under forest, irrigation might reclaim a little, and the draining or filling up of coastal swamps and lagoons would add something to the surface available for agriculture; also, a small extension of the fields might be achieved by a readjustment of their boundaries. Such processes would, theoretically, increase the cultivable land 5 per cent., thus bringing up the total area which could yield crops to an absolute maximum of 20 per cent. of the whole surface of the country.

With regard to other parts of the empire, the climatic limitations of *Karafuto* (Sakhalien) not only restrict farming operations at the pre-

sent time, but exclude the hope of the future agricultural development of this region to any great extent. In *Taiwan* (Formosa) all the readily accessible plains have been under cultivation since the first Chinese settlement some three hundred years ago, but a little more ground might be made productive among the upland slopes and valleys, and along the eastern coastal strip. There is but little cultivated land in *Chosen* (Korea)—only about 8 per cent. of the surface. Were we to set aside the natural conditions and social institutions and traditions of the Koreans, we might contrive to extend the area of fields in the peninsula, but, even so, little agricultural expansion is looked for in this part.

Distribution of Agricultural Settlements, etc.—The density of population and the degree of cultivation are directly proportional to the distance from the great centres of culture and industry, around which both the area under treatment and the degree of intensive cultivation approximate a maximum.

The actual nucleus of Japanese civilisation lies really on the ground that borders the Inland Sea (Setouchi), along the southern coast of Honshiu, parts of the Kinki peninsula, and in the Tokaido district which stretches along the 35th parallel of latitude. Here agriculture gives quite a characteristic appearance to the landscape, not only by the dense crowding of the small allotments, but by the use of horses and cattle for work on the farms and in the fields. In this district the farmer is guided in his choice of crops—within certain natural limits—rather by their market value than by any other consideration.

Most of the land yields two crops a year; it is kept dry, and is sown with wheat, barley, or some other cereal, during one half of the year, and is flooded and used for rice during the other half. More land is thus made to serve a double purpose than is kept for dry farming alone. With the exception of Taiwan, which possesses a sub-tropical vegetation, the production of ordinary crops increases at the expense of rice in all the outlying parts of the Japanese dominions. In the north the growth of rice is very limited; indeed agriculture as a whole is much less flourishing than in the central and southern districts. But while production is smaller in the north, the actual number of farmers is greater; labour is necessarily cheaper, and the whole standard of living is considerably lower than elsewhere in Japan.

The number of farmers in the country at present is practically a maximum, indeed, a decrease in the percentage of farming households has already been noticed. Notwithstanding this fact, the agricultural output is increasing in a very satisfactory manner, owing partly to the use of machinery, and partly to improved methods of cultivation.

If we may regard a farm-settlement, consisting of a household or group of households and the fields belonging to it, as an *agricultural unit*, then we recognise four types of such units in Japan, each with its characteristic distribution, arrangement, sub-division and method. They belong to the four great peoples—the Japanese, the Chinese, the Koreans, and the Americans. The Japanese type is found in all the areas of oldest settlement in the main islands; the Chinese type is firmly established in Formosa, and the Korean in Korea. These three

belong to what we may call the concentrated system, where the agricultural units are packed together as closely as possible. The Japanese type is the most concentrated, and differs from the Chinese chiefly in the more regular arrangement and more minute division of the holdings. The Korean type resembles both the former, but is more primitive than either, being guided by a somewhat haphazard method.

The American system is being used on the mainland of Hokkaido (Yezzo Island) and in all the recently acquired territories. It is opposed in many ways to the old systems, and tends towards a wide and sparse distribution of settlements, scattering them over large stretches of undivided land. Also machinery and animals are used for farm work rather than the excessive human labour which is so characteristic of the older systems. It is less than half a century since the first American farming experiments were started in Hokkaido: they were also instituted in Taiwan—in a modified form, to suit the tropical climate—after that island was ceded to Japan by China (in 1895), principally in those districts which were not already producing under the Chinese system of culture.

Agricultural population.—It is extremely difficult to give exactly the number of farmers in Japan, because every member of a farming household who is physically capable does some work on the farm; but the number of farm-households is definitely known to amount to over 60 per cent. of the total number of households in the main islands. Statistics for 1907 show that in this same area—*i.e.* the four large islands and the surrounding small ones—with the Riu Kiu Islands subtracted, there are 54,000 sq. km. of surface under cultivation, of which about 28,000 sq. km. are occupied by paddy fields and 26,000 sq. km. by dry fields. Particulars as to the outlying parts of the empire will be given later.

Some information as to the movements of the agricultural population may be of interest at this point:—

Hokkaido is the only part of the home lands which provides an outlet for the surplus energy of the Japanese farmers. For ages it has been in the hands of men from northern Honshiu who go to work there in winter and early spring, when the rigours of the climate at home render the ground useless for months at a time. For similar reasons the fishermen from the north-east shores of the Japan Sea seek an opening and a reward for their toil on the farms of Hokkaido when their fishing is checked by the winter storms.

But both the farmers and the fishermen return to their homes when the spring is over—theirs is but a temporary emigration. Emigration for settlement, however, is seriously undertaken and managed by the government, who encourage settlers from all parts of the islands by reduced fares, assisted passages, and grants of land upon certain terms which conduce to its proper cultivation and development. Between 50,000 and 60,000 people have annually been taken to Hokkaido in this way in recent years, and the rate of colonisation may continue for some time to come with advantage both to the colonists and to the island—it is still far from over-populated. The congestion of the older settlements on the mainland is also slightly eased by emigration to the

countries bordering the Pacific Ocean and to many of its islands, especially Hawaii and the Philippines, where numbers of Japanese subjects are working, chiefly as farm labourers. Some 300,000 men of this class are known to be living along the Pacific Coasts.

TABLE showing the percentage of the whole area under water rice (paddy fields), dry farms, residential areas and forests: also the increase or decrease in prosperity from 1884 during intervals of ten years, for the Central Islands of Japan.

	Percentage of whole area.				Average possession per head of population.			
	Paddy fields.	Dry fields.	Residential areas.	Forests.	Paddy fields.	Dry fields.	Residence.	Forest.
1884 .	20·9	14·9	2·8	53·7	17·00	4·217	0·27	18·00
1894 .	19·9	16·5	2·8	52·9	6·15	5·12	0·27	17·15
1904 .	20·3	17·1	2·8	51·2	5·27	4·27	0·24	14·27
1912 .	19·4	16·3	2·6	52·6				

General view of the agricultural produce.—There is a steady increase in the agricultural output in Japan—according to the statistics of 1907 it amounted to about half the value of the whole production of the country.

Total production valued at 3040 million yen [1 yen = 2·048 shillings. £1 = 9·763 yen].

Product.	Value in million yen.	Percentage of total value of production.
Agricultural, ...	1390	45·6
Industrial, ...	1260	41·4
Mineral, ...	110	3·7
Forest products, ...	120	3·8
Fishing, ...	120	3·8
Dairy produce, ...	50	1·8

The rate of production is highest in the most thickly peopled, *i.e.* in the earliest settled districts. Notwithstanding the fact that much of the surface of these parts is very mountainous, agricultural activity decreases as we recede from the centres of population; it also became very much reduced on the central uplands of Honshiu.

Food crops are of primary importance, realising about 870 million yen in 1907, nearly three-fourths of the total value of the agricultural products. Rice alone was valued at 700 million yen, while naked barley and wheat together realised about 150 million yen. Other food materials are the soy bean, the small red bean, fox-tail-, barnyard-, and proso-millets, buckwheat, sweet and ordinary potatoes, peas, beans, ground nuts, maize or Indian corn. There is also a considerable trade in such vegetables as radishes and carrots, the burdock and the bamboo sprout, edible roots, ginger, chillies, the food-lily and taro, turnips, rapes,

cabbages, onions, leeks, cucumbers, lotus and arrowroot, various melons, the egg plant, tomatoes, etc.

Out of the total value of agricultural products (1400 million yen approximately) about 214 million yen proceeds from such special crops as silk yarn—which alone realised about 140 million yen—cotton, hemp, leaf indigo, tea, tobacco, rape seeds, the lacquer tree, luffa, china grass, sugar cane, paper mulberry, the wax tree, metsumata (a kind of mulberry), rushes for malting, shitiloi (another kind of rush used for malting), ginsing (dried drugs), peppermint, flax, and osiers. There are flower farms, too, which cultivate the lily for exportation, while the mulberry is of the utmost importance as food for the silkworms. There is an abundance of garden and orchard produce—valued approximately at 116 million yen—which includes such fruits as apples, grapes, several kinds of oranges, pears, peaches, "kaki," apricots, plums, etc.

Ever since the opening up of Japan to foreign commerce the import trade in agricultural material—over 40 per cent. of the whole import trade—has exceeded the export—just about 40 per cent. of the whole exports—although agricultural produce makes up quite one-third of the whole export trade of Japan. The most conspicuous item in the latter, however, is silk yarn, which yields, on an average, about four fifths of the value of the whole agricultural export returns: tea yields about one-tenth, and waste silk yarn and rice bring in considerable sums of money.

Of the imported agricultural materials, raw cotton is the most conspicuous, amounting to two-thirds of the total value of imported goods: rice makes up one-tenth, while soy beans, with their refuse, fibres for textile manufactures, and refined sugar are brought into the country in large quantities.

The statistics of 1912 give the following figures:—

Total export trade = 550 million yen = £55,000,000 (approx.)
Total import trade = 640 „ = £64,000,000 „

If we remember that our whole trade is just about one-seventh of the trade of the British Isles, while the area of our country and the density of population are nearly equal to those of Great Britain, it may bring home to my readers the economic straits in which Japan is now placed.

We have specialised in certain articles for which, fortunately, we can always find a ready market: for instance, we supplied between one-fourth and one-third of the silk of the whole world in 1911, although we had to compete with China. The demand for Japanese silk, however, is chiefly in Europe and America. There is reason to hope that we may be able to maintain our position in the front rank among the silk-producing countries of the world. The future prospects of our tea trade are more doubtful, as it has to force its way into the market beside the old established Indian and Chinese teas. There is quite a satisfactory traffic in such minor materials as linseed-oil, peppermint, apples and oranges, etc., while the import of raw cotton and sugar for our manufactures is on a large scale.

Special Description.

Food Stuffs.—Rice.—Rice is a sub-tropical plant characteristic of the monsoon regions, so we find it growing luxuriantly, practically throughout Japan. Its geographical limits are restricted by a minimum mean annual temperature of 5° or 6° C., and this condition is obtainable in all parts of the empire except Karafuto, for the 5° mean annual isotherm runs roughly ESE.-WNW. between Hokkaido and Karafuto.

Rice is the staple food of the Japanese, as of most oriental nations, and its cultivation in our islands dates from prehistoric times.

There are two great classes of rice, upland rice, grown on dry land like ordinary crops, and water-rice, grown in flooded fields called paddy fields. There are also special geographical types, such as the Korean crop, with its small, well-flavoured grain; the Japanese grain, larger, but with a less characteristic taste; and the Chinese rice, insipid but nutritious. The last flourishes in Formosa.

There is also a classification of rice according to the length of its growing period—hence we find three great classes: (1) Okude ("latest ripe") is the best variety, but it takes long to mature; (2) Nakade ("middle ripe") is inferior to Okude, but it ripens sooner; while (3) Wase ("earliest ripe") spends but three months on the ground. These early ripening grains, though inferior to the slower grown variety, are sometimes to be preferred, because the risk from such climatic accidents as floods and cyclones is lessened, and moreover, there is time to sow and reap another crop if one is spoilt. So farmers are guided in their choice of grain by the topographic and climatic peculiarities of their own particular district as well as by the intrinsic value of the crop.

The area under rice, both upland fields and paddy fields, is about 71 per cent. of the cultivable ground—about one-tenth of the whole surface of the country. [Formosa and Korea will be treated later.] Every year new land is being sown with rice. Hokkaido was formerly thought to be unsuitable for rice cultivation, but accurate meteorological observations made it appear possible to grow rice even in this northern island; and now it is only on the rough uplands of the interior, and on the fog-laden eastern coastal belt that its cultivators meet with serious climatic difficulties. The best water-rice fields lie along the Ishikari river which flows out into the Japan Sea. The plain of the lower course of this river is indeed the cradle of all agricultural efforts in Hokkaido, for the land there is level, well watered, and sheltered by the surrounding hills. On the whole the financial returns are quite in proportion to the labour expended on agriculture in Hokkaido—but even now only three-thousandth of the surface is under cultivation, so much remains to be done in this island.

Central Japan is the most important area of rice production, especially where the granitic tracts furnish very fertile soils.

In 1909, about 97 per cent. of the rice land was under water, while only 3 per cent. was left for upland rice. The districts in which the rice fields are most densely packed are—(1) Niigata Ken (county), drained by the Shinanogawa; (2) the Nobi district, including the basin

of the Kisogawa; (3) the northern part of the Kinki peninsula, where there are numerous lowlands, foundered areas, shut in by low ranges of hills. It is on this last stretch of land that the historic capitals of Japan were situated, confirming the right of this ground to be called the centre of Japanese civilisation—as indeed it is, having fostered the growth of the Yamato culture since the destruction of the rival capital in Chiugoku, the home of the Izumo civilisation, until the Meiji restoration when, for political and economic reasons, the capital was moved eastward to Yedo—now called Tokio—where it lies in an unfamiliar setting with a hinterland which is not, as in the old sites, part and parcel of the town that is encircled.

Other famous rice-growing areas are the central belt of the Inland Sea, and several lowlands in northern and southern Kiushiu, while some of the inland parts of Honshiu are well known for their upland rice fields.

Among the islands, the Riu Kiu group grow very little rice. Formosa, on the contrary, is the only part of the empire in which the soil can be made to yield two crops of rice a year continuously. On an average of five years' statistics (1905-9) about 90 per cent. of the area is under paddy fields, and only 10 per cent. under upland rice: but this proportion varies with the season: the spring crop has more water-rice —93 per cent. as against 7 per cent. grown on dry ground. In the autumn the dry area is increased, and we find 88 per cent. of flooded fields and 12 per cent. of dry—it is generally the rainfall that regulates the proportion of wet fields to dry.

The Chinese first acquired a footing in Taiwan, and they have established there most of their own methods of cultivation.

The differences of climate between north and south Korea are not so vast as to affect the cultivation of rice, which we find throughout the peninsula in scattered patches, densest in the south and on the western slopes which face the Yellow Sea. Quite 98 per cent. of the rice land is paddy field, while only 2 per cent. is occupied by dry fields.

The following table shows the distribution of rice fields in the whole of Japan in 1909:—

	In Thousand Chobu.
Main Islands, (Honshiu, Shikoku, Kiushiu, Hokkaido and the adjacent islands.)	2938
Taiwan (Formosa),	484
Chosen (Korea),	710

	Area under Rice in Chobu.	Harvest in Koku.	Yield in Koku per Tanbu.
1887-1891,	2,712,118	38,574,312	1·42
1892-1896,	2,769,914	39,351,458	1·42
1897-1901,	2,824,038	41,701,215	1·48
1902-1906,	2,874,477	43,862,175	1·53

Without giving full details, it may be of interest to describe some of the more famous rice-growing districts.

In Hokkaido the yield is relatively low, only 1·36 koku per tanbu (= 27 bushels per acre). The reason for this is to be found in the short ripening period allowed by the short summer—only three months—which necessitates also the use of the rice grain called Wase, whose growing period is brief enough to let it ripen between June and August, but it is not a very good quality of rice, neither is the crop abundant.

The O-u district, which occupies all the north of Honshiu, is somewhat similar to Hokkaido in build and climate, so the rate of production is approximately the same, about 1·47 (29·7 bushels per acre), but it reaches, at times, as much as 2·07 koku per tanbu (*i.e.* 41·9 bushels). The extreme north is perhaps a little more productive than the south.

The great plain of Kwanto, though of vast extent and fairly level surface, is not very suitable for the cultivation of rice, chiefly because the soil—a kind of fine loam formed of volcanic dust—is prone to become a sticky mud when wet. It is by no means unsuitable for other plants, however, and the mulberry tree flourishes upon it together with various cereals. Rice is grown principally along the rivers on the alluvial deposits, so it is rather limited in quantity: neither is the quality very good. All three kinds of rice are grown in this district, and it has no characteristic crop, though Wase is perhaps the least used. Its yield varies between 1·51 and 1·74 koku per tanbu—about 30½-35 bushels per acre.

In central Honshiu lies the highest land in Japan—the Japanese Alps. The rough surface of the country is deeply dissected by the upper torrential courses of the rivers which radiate from the centre of the district in almost all directions. The only land suitable for rice fields in the inland parts lies along the middle courses of the rivers, where they flow over the low terraces which descend to the coast; there, however, all level ground, including the river flood-plains, is covered with rice fields. There are, indeed, three districts of noted fertility in this province. Of these one, Niigata Ken, occupying the lower valley of the Shinanogawa, is the richest rice land in the empire, but it does not grow the best quality. Toyama Ken further west is situated on the northern slopes which face the Japan Sea; it is especially favoured by climate and topography as rice-growing ground. At this latitude, the temperatures are higher on the northern than on the southern shores of Honshiu—an effect which is due to the combined action of the warm ocean current—the "tsushima stream" which runs up the west coast—and the prevailing westerly winds which blow on to the slopes of the Hida plateau, laden with the moisture gathered during their passage over the heated waters. The result is an abundant rainfall in summer—from 79 inches to 118 inches—and in winter a thick mantle of snow, which sometimes lasts far on into the hot months. About 23·5 per cent. of the surface of this county can be cultivated, thanks to the broad alluvial plains which testify to the transporting power of the many rivers. According to the statistics of 1907, about 83·36 per cent. of this land was under rice, so that only a very small percentage was left for other crops.

The Nobi plain is the third well-known rice district. It occupies the lower course of the Kisogawa and is famous for crops of several kinds. Statistics are only available for Aichi Ken, which lies on the southern part of the plain, but its produce may be regarded as typical of that of the whole area.

The following figures show the yield of the rice harvest in the three districts named:—

Niigata Ken, . .	1·64	koku	per	tanbu	= 32·66	bushels per acre.
Toyama Ken, . .	2·05	,,	,,		= 41½	,, ,,
The Nobi Plain, .	2·0	,,	,,		= 40½	,, ,,

The province of Kinki originally included seven counties, of which all but two produce over 2 koku per tanbu—over 40 bushels an acre—and yield, too, a good quality of rice.

The Nara Plain is the oldest site of rice fields in the land, and the most fruitful, yielding 2·34 koku per tanbu (47 bushels per acre), the highest yield yet attained in Japan. Osaka Fu[1] has a yield of 2·24 koku = 45·4 bushels, and Kioto Fu 1·87 koku = 37 bushels per acre. These last numbers are somewhat misleading, as there is a great extent of bare upland in the Kioto district which is entirely unproductive. Both areas are very populous, especially the Osaka region, which is sometimes called the Black Country of Japan on account of its numerous factories, while Osaka, the capital, is often spoken of as the Japanese Manchester. Here the brewing of wine from rice is largely carried on, while along the coast are many towns from which rice is exported in great quantities.

Several minor industries have grown up in Kinki and the neighbouring province of Chingoku, owing to their peculiar topography. The rice fields, which lie near the base of the mountains, are exposed to the danger of an influx of water from the slopes after rain. Both by its low temperature and the rapid flow, this rain-water checks the growth of rice: fortunately, however, it usually follows more or less definite channels, leaving the rest of the field undisturbed. When the zone of no disturbance has been found, it is reserved for rice-growing, but the remainder is planted with rushes, which are plaited into mats, etc. In this way a rush-plaiting industry has sprung up. Basket-making from osiers, which grow in swampy places among the foot-hills, is a sister trade. The land yields two crops in both these counties: rice is sown in summer and reaped in autumn, then the ground bears some other cereal.

Chingoku, on account of its very mountainous surface, has a lower average production than Kinki.

Northern Shikoku is like the neighbouring province on the mainland (Chiugoku); the rice crop is, however, a little larger. In the southern half of the island the very favourable climatic conditions are unfortunately counteracted by the broken surface of the country, so the

[1] The term "Fu" is a name given to the land within a certain radius of the three great cities, Tokio, Osaka, and Kioto.

rice crop is relatively small. From prehistoric days the harvest here has ripened earlier than in any other part, a circumstance which makes it possible to have a second rice harvest, and an attempt is now being made to raise a double rice crop. While this necessitates the use of the inferior grain Wase, it lessens the risk of total loss from destruction by the cyclones which not infrequently sweep over this region with disastrous effect. The north of Kiushiu resembles northern Chiugoku in general physical characters. The island is crossed by two sets of intersecting fractures, between which, in many instances, great areas have sunk, and we find level plains covered with excellent soil formed of decomposed granite and Palæozoic rock; while broad alluvial deposits also provide good sites for rice fields. The soft Tertiary sediments, which occupy a large part of the surface, contain valuable beds of coal. This is a very important rice-producing district, for it is here that the favourite Japanese grain is grown: the yield, however, rarely exceeds 2 koku per tanbu = 40½ bushels per acre.

Although the southern half of the island has the milder climate—like southern Shikoku—the topography again prevents the fullest advantage being taken of this favourable circumstance by rice growers. The region is subject to volcanic eruptions, which not only disturb the soil, but spread out vast layers of mixed lava and lapilli, which are wholly unsuited to rice crops, hence the yield is inferior both in quality and in quantity. In all these districts [Chiubu, *i.e.* central Honshiu west of Kinki, Kinki, Chiugoku, Shikoku, and Kiushiu] the variety of rice known as Okude is preferred, except where, for special reasons, an early harvest is desired, and Nakade or Wase is substituted.

In the Riu Kiu Islands rice growers have to contend with considerable difficulties through insect-pests, while the very strong winds which blow there are an additional grievance. The central and southern members of the group, which come within the administration of Okinava, are rendered somewhat infertile by a porous limestone, which forms most of the lowlands. It is not surprising, therefore, that the rate of production is low, only ·73 tanbu = about 14 bushels per acre.

Taiwan (Formosa) has, as we have already said, two rice harvests. This is more particularly the case towards the centre and south of the island. The average annual harvest between 1905 and 1909 was 8·85 million koku = about 44,000,000 bushels. When compared with the mainland, the returns are remarkably low, both from the paddy and upland rice fields. The former yield ·96 koku, approximately 19 bushels; the latter only ·69 koku, nearly 14 bushels an acre. With the double harvest this amounts to 1·65 koku per tanbu, or just over 33 bushels an acre.

This yield is little more than half the average for the whole of Japan, and it is, moreover, much more expensive in labour; but the soil is so exhausted by lack of manuring that the low yield is all that it can give; yet the ground must be constantly worked, and the double crop must be continued, in order to supply the needs of the population. The first crop of the year is larger than the second in the proportion of 14 : 11.

Farm work in Taiwan is done by buffaloes and oxen; horses are but little used.

Rice-growing was not successful in Korea chiefly because the natives used no intelligence in the management of the crops; they never manured the ground, nor changed their ancient method of cultivation. Since the peninsula became part of the Japanese empire things have improved, and new methods are adopted with considerable success around the Japanese settlements.

In 1909 the rice harvest amounted to 7·46 million koku = 36·7 million bushels, and this was reaped from necessarily discontinuous areas whose average yield was about 1·65 koku (32·7 bushels per acre) on the water rice fields, and ·98 koku per tanbu (20·1 bushels per acre) on the dry fields. There is reason to expect greater harvests from Korea: the climate is nowhere prohibitive, while the topography, especially along the southern and western slopes, is quite suitable for rice-growing. The great basaltic plateau which stretches away to the north-east, rising to an average height of over 3000 feet above the sea, is clothed with dense forest, and is most inhospitable to the farmer. A singularly fertile basin lies a little to the north-west, just beyond the boundary of Japanese territory, in Manchuria.

The consumption of rice, particularly in the three main islands, is practically proportional to the population. The following interesting statistics and calculations were issued by the Japanese Chamber of Commerce and Agriculture. At its present rate of increase the population will in successive decades reach the following figures:—1907, 49·012 million; 1917, 55·602 million; 1927, 62·974 million; 1937, 71·325 million. In 1969 it would probably exceed 100 million. The annual consumption of rice per head in Japan is 0·95 koku = 4·6 bushels. If we remember that it is the staple food of the people, and compare this rate of consumption with that of wheat in Europe and America, as wheat is the staple food of most white races, we find quite a close correspondence, *e.g.* in the British Isles, which lie in about the same latitude as northern Japan, 5·6 bushels of wheat are used annually per person. If now we look for a parallel to sub-tropical Japan, we find that in Italy the average consumption of wheat is 4·4 bushels per head. In Germany it is curiously low, only 3·2 bushels, while in the United States of America it is about 4·7.

[The calculation for Japan was made thus: home-grown rice + rice imported from Formosa and foreign countries − exports from Formosa and other lands ÷ whole population.]

The figures given enable us to see a little way into the future of rice, always supposing that the rate of increase of population continues, and that the methods of extensive and intensive cultivation which we propose to adopt suffer no check. If, then, we reckon the rate of consumption as 1 koku per person, the quantity of rice consumed in 1907 must have been 49·092 million koku. (This is perhaps a little high, as the annual average for the five years 1905-9 only reached 47·398 million koku.) For this demand the supply from home sources was only 44·509, so that about 4·583 million koku has to be imported from abroad. If the

present birthrate continues the population will have increased to 71·825 millions in thirty years. The rice crop may be made to yield more by intensive cultivation and other methods, but even so its maximum yield, from an optimist's point of view, can amount to little more than 65·818 million koku; while the pessimist is faced by a harvest which may rise to, but cannot exceed, 63·302 million koku. In the former case, the deficiency to be made up is 5·507 million koku, in the latter it is over 8 million koku.

It seems that demand must continue to exceed supply, and Japan must import rice from foreign lands unless some of its outlying regions can increase their output.

If in Taiwan (Formosa) we assume that affairs will progress from their present state at the same rate and in the same direction as on the mainland, then, in thirty years' time the yield will be about 9·206 million koku, while the consumption of rice in the island will only amount to 4·7 million koku. Therefore we may look to Formosa for about 4·506 million koku of rice.

In Chosen (Korea) there is a different rate of consumption for the natives and the Japanese settlers. The latter keep to the general average for their nation (1 koku per person), while the Koreans use just about half the quantity, because they subsist largely on corn and other grains. We must assume the same rate of progress here as elsewhere, so that in thirty years' time the population will be some 8½ millions, while the rice crop will be about 10½ million koku. From the actual figures a surplus of rice amounting to 2,081,383 koku remains, and if we add this to the excess of the Taiwan crops we get 6,587,383 koku—which will adequately supply the deficiency of the home growth —*assuming the optimist's conditions.* If, however, the pessimist's prognostications are realised the situation will present but a poor future for rice-growing.

A comparatively large proportion of rice—about 6½ per cent., some 3,000,000 koku—is used for brewing wine. Although quite 400 million koku of this wine is made every year, the demand for it is increasing with the ever-growing population.

Trade in Rice.—In 1910 exported rice amounted to about one-ninth of the total quantity of food-stuffs sent out of the country, in other words, to one-eighteenth of the whole exports of Japan. There is a great demand for rice from home among the Japanese inhabitants of Hawaii, so much so, indeed, that quite one-fourth of the exported rice goes to those islands. Great Britain takes about one-fifth, while France, the United States of America, Canada and Holland buy varying quantities.

Much rice is imported; about 50 per cent. comes from French Indo-China, and smaller proportions from Siam and British India. Altogether rice makes up one-fifth of the whole imports of Japan.

The following tables show the area under rice and the harvests during the years 1902-1911. [The value of the "normal crops" is obtained by taking the mean of the crops of seven normal years added to two abnormal years, one excessive and the other deficient.]

AREA (in Chobu).

	Ordinary Rice.	Glutinous Rice.	Upland Rice.	Total.
1902, . .	2,499,129	263,870	84,193	2,847,191
1911, . .	2,611,319	264,395	97,359	2,973,073
Normal Area, .	2,565,921	262,788	80,268	2,911,486

PRODUCTION (in Koku).

1902, . .	33,188,337	3,137,262	606,667	36,932,266
1911, . .	44,368,373	4,297,893	1,028,617	51 694,883
Normal Crop, .	44,213,545	4,080,493	770,678	49,070,417

AVERAGE RATE OF PRODUCTION (in Koku per Tanbu).

	Ordinary Rice.	Glutinous Rice.	Upland Rice.	Average.
1902, . . .	1·328	1·185	0·721	1·297
1911, . .	1·776	1·626	1·057	1·739
Normal Crop, . .	1·723	1·553	0·960	1·685

TRADE IN RICE (in Koku).

Average of the five years	Exports.	Imports.
1897-1901, . . .	342,592	2,103,461
1902-1906, . . .	331,206	4,124,422
1907-1911, . . .	323,221	1,748,673

(To be continued.)

THE KAMES OF CARSTAIRS.

By Professor J. W. GREGORY, D.Sc., F.R.S.

(With Sketch-Maps.)

I. INTRODUCTION AND PREVIOUS LITERATURE.

THE kames of Carstairs have been generally regarded as the typical Scottish kames; and they are so easy of access, being well seen from the main line of the Caledonian Railway, that this selection is convenient. No adequate description of them has been given. Sir Archibald Geikie briefly described their range and structure in 1863, and again in 1873 in the memoir accompanying the Geological Survey map, Scotland, Sheet 23, and their general course is shown on that map: and a short account of them was given by the late James Geikie (1894, pp. 181, 187, 190). Reference has been made to them, amongst others, by A. C. Ramsay (1872, p. 160), and they have been briefly described by the author in contrast with the Polmont kame (1912, pp. 211-214), and subsequently (1915, pp. 160-1), in reference to their relations to other drifts and to post-glacial denudation in their neighbourhood.

II. THE KAMES.

1. *Plan and Structure.*—The kames of Carstairs are a line of hills of fluvioglacial gravels, and they extend from Cauldlawbank south-west-

ward to Newmill, which is on the Mouse Water above Cleghorn railway viaduct (Map, fig. 1). Fluvioglacial gravels occur beyond Cleghorn and around Lanark, and these have been regarded as part of the kames of Carstairs. These beds are in places indistinguishable in composition from the kame gravel, but they do not form regular ridges; where they occur as rounded mounds, and thus resemble some kames, their form is probably due to the denudation of sheets of fluvioglacial gravel.

The north-eastern end of the kames is west of Cauldlawbank, whence they run south-westward, separating Woodend Moss and Carnwath Moss. They are cut through by the Caledonian Railway nearly two miles to the north of Carnwath Station. The kames consist at first of disconnected mounds; further to the south-west they occur as a single continuous ridge about 100 yards wide. It rises from 15 to 40 feet above the peat mosses, which are there about 710 feet above sea-level. Near Woodend farm the kame becomes broader: it is about a quarter of a mile across, and is divided into two ridges by a valley which extends nearly half a mile south from Woodend. The kame here forms the divide between the Blackgate Moss to the west and the Carnwath Moss to the south-east. The ruins of Couthalley Castle stand on a projecting headland from the kame into Carnwath Moss. The western or outer branch of the kame is the narrower and higher, and the road from Wilsontown to Carnwath runs along it for half a mile. The kame here rises to 775 feet and is about 60 feet above the adjacent peat flats. Its structure is well shown in a gravel pit beside the Wilsontown road. The gravel is roughly stratified, for a band of large boulders crosses the upper part of the pit. The boulders are mainly Old Red Sandstone, Tinto felsite, and Coal Measure sandstone. The smaller boulders include Ordovician chert and graywackes from the Southern Uplands. A census of the constituents of this gravel, including pebbles and cobbles up to 3 or 4 inches, is given in the table on page 471.

Near this pit the kame bends south-westerly; its height falls to about 20 feet, and it is in places only about 40 yards wide. The kame, however, widens till it forms several ridges: those that pass east of White Loch are irregular, but as they pass westward they become more regular and form the well-defined southern or inner kame; and this line was doubtless connected with the outer kame through a low mound to the east of the Wilsontown road near the gravel pit.[1] The northern division of the kames passes to the north of White Loch, and near Red Loch divides into two ridges, one on either side of a small unnamed loch 200 yards west-north-west of the Red Loch. The northern ridge is connected to a mound-like outlier which rises about 70 feet above Ryeflat Moss, to the north-east of Ryeflat House. This branch then ends against the alluvium of the Mouse Water. The main kame passes to the south of the unnamed loch and to the west divides into two branches: the northern branch rises steeply to the height of 50 or

[1] The name "Kame-end" of a hamlet, a mile east of Carnwath, suggested that a branch of the kame might occur there. A conspicuous mound on the southern side of the main road west of Kame-end is kamelike; but it is a drumlin, and the undulating ground in the neighbourhood consists of boulder clay.

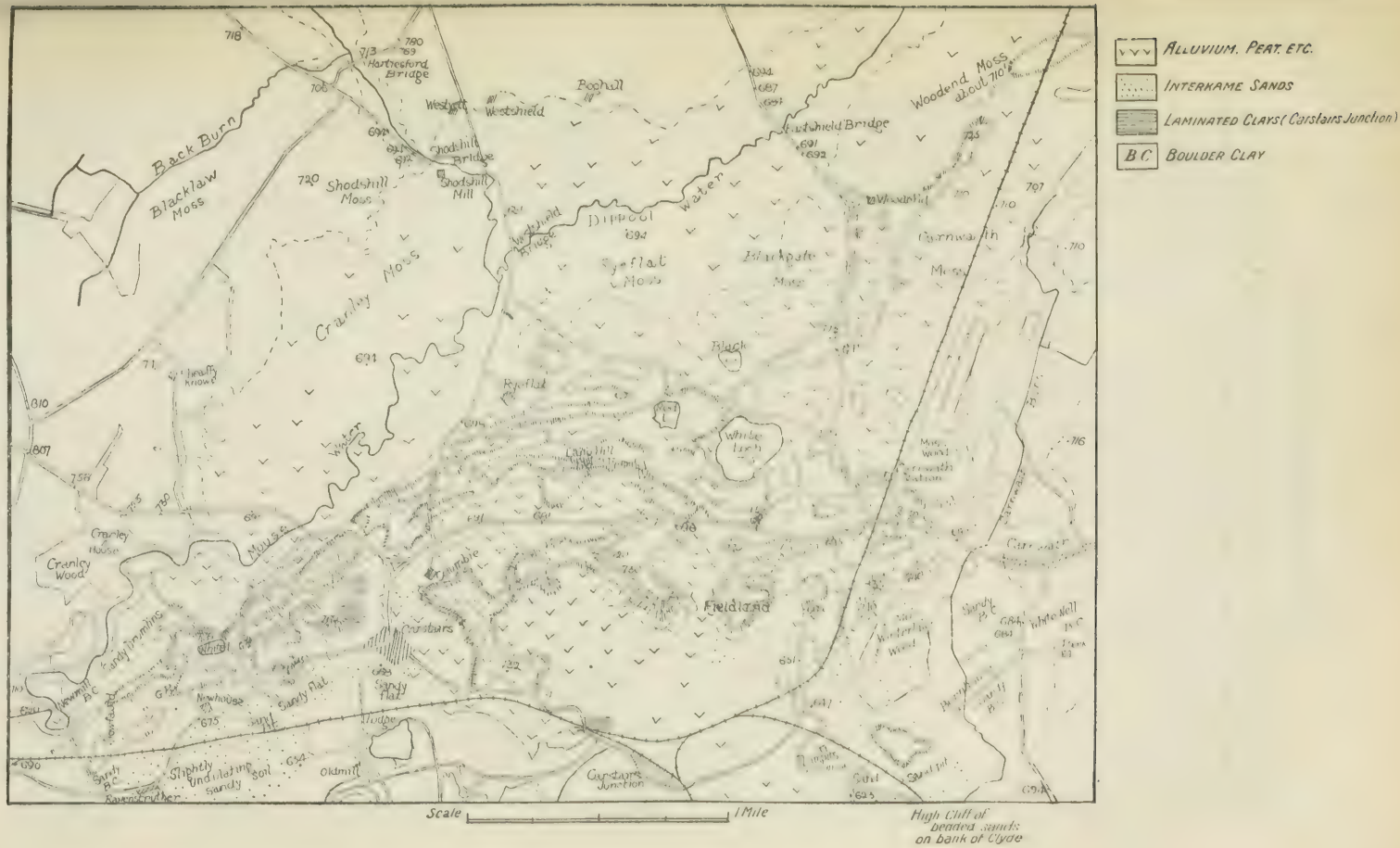


FIG. 1. THE KAMES OF CARSTAIRS. The kames are shown by hill-shading, free from dots.

The map is based on a reduction from the 6′ maps of Lanarkshire, by permission of the Controller-General of H.M. Stationery Office.

60 feet near Ryeflat. A series of peat-filled hollows separates the Ryeflat kame from the southern branch, which is about 150 yards further

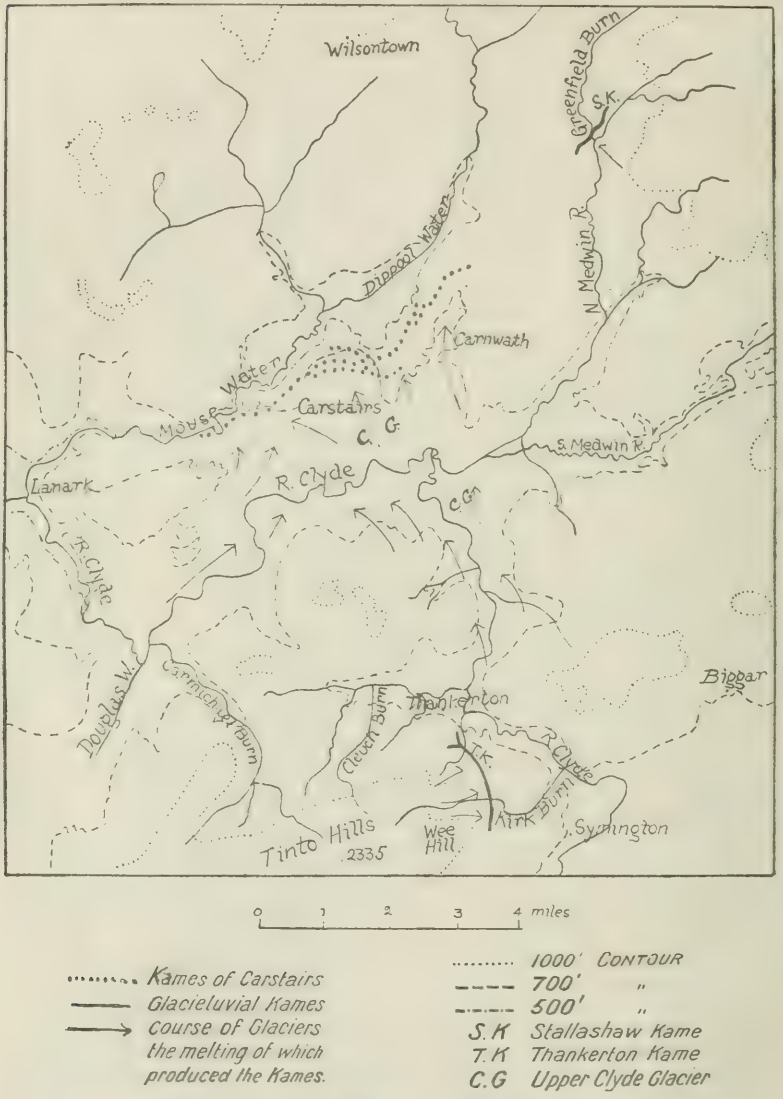


Fig. 2.—General relations of the Kames near Carstairs.

south, and rises to the height of 770 feet beside the gap crossed by the Shodshill road.

The less regular southern kame to the south of the eastern White Loch curves northward and passes through Lang Hill (773 feet). It is

there joined by a ridge which trends south-eastward and ends close beside the Edinburgh road. The Lang Hill kame continues westward: to the east of the Shodshill road it gives off two low branches to the south-west, and is itself continued as a narrow straight ridge 150 yards north of the Edinburgh road. West of the Shodshill road the full width of the kame ground is about a quarter of a mile, and it is occupied by three main ridges separated by depressions, which doubtless originally had no outlets.

To the south-west of the road from Carstairs village to Cowford Bridge the northernmost section of the kame is a low ridge, three furlongs long and about 25 feet high. Behind it is a narrow valley, above which the main or northern kame rises steeply to the height of about 750 feet, or 60 feet above the low ground before it. The kames are here covered by woods: they enclose a series of elongated hollows, some of which have been drained artificially. These hollows again divide the kames into three lines; the southernmost passes the gravel pit east-south-east of the western White Loch, forms the high rounded gravel hills to the north of the Lanark road, and rises behind Carstairs village to the height of 762 feet, or 80 feet above the road. The kames continue for about a quarter of a mile west of the road past the western White Loch. The northern ridge rises to 776 feet, or about 80 feet above the low ground to the north; the southern ridges reach about the same level. West of the White Loch wood the levels fall to about 700 feet, and the kames are in places as crowded with rounded water-worn pebbles as a sea-beach. The northern kame ends on the eastern bank of the great loop of the Mouse Water at Newmill. The two kame ridges that pass south of the western White Loch continue south-westward; one of them ends near the gravel pit 100 yards north-west of Newhouse. This pit includes an upper bed of sandy gravel, then a layer crowded with boulders, and at the base sand and gravel with some boulders. The largest boulders are of Old Red Sandstone and they range up to more than 27 inches in diameter: others consist of Tinto felsite, Silurian graywacke, basalt, Carboniferous sandstone, etc.: and a few boulders show marks which may be the obscure traces of glacial grooves. Fragments of rocks from the Southern Highlands also occur. West of this pit the kames continue through some low gravel mounds to Howfaulds, where they turn south-westerly, cross the railway, and die out at the height of about 700 feet just west of Ravenstruther. Just west of Newmill a small patch of kame material forms the uppermost 20 feet of the mound on the eastern end of the narrow ridge which rises on the left bank of the Mouse Water between Newmill and the Cleghorn viaduct. This ridge itself looks from the train like a kame,[1] but the sections in its bank, though poor, show that it is composed of boulder clay, and is therefore a long drumlin. Between it and the railway near Silvermuir is undulating ground rising to the height of 690 feet;

[1] Other drumlins, which, seen from the railway, suggest the western continuation of the kame, occur between the Lee Burn and Cartland Muir plantation, a mile south-east of Braidwood Station, at the level of a little over 700 feet. Irregular patches of sand from the kames occur on fields beside these drumlins, which are, however, composed of boulder clay and have no connection with the kames.

these undulations are also due to boulder clay drumlins, though the soil is unusually sandy, as it is covered by material washed from the kames. The superposition of the kames to the boulder clay is well seen in the banks of the Mouse Water near Newmill.

The kames end to the south-west against the high ground between Cleghorn and Lanark, which in places rises above the 800 feet contour, whereas the general level of the ground in front of the kames is a little below 700 feet.

To summarise the course of the kames—they begin to the north-east as a low single ridge, which divides into a series of confluent ridges that are separated by peat-filled depressions; some of these hollows originally can have had no outlet. The kames for most of their length consist of three main ridges, which fall in height somewhat abruptly to the south-west of Newhouse; and the kames finally end near Newmill and Ravenstruther in low mounds and banks resting on an undulating surface of boulder clay. The northern face of the kames is the best defined, and it rises steeply from the alluvial plains of the Mouse Water. The southern margin is less regular, and the kames pass gradually into the inter-kame sands.

2. *The Composition of the Kames.*—The kames consist of bedded gravels with layers of coarse pebbly sand. The stones are always thoroughly water-worn; I have never found a glacially striated pebble in the kame, but occasional boulders show grooves which may be glacial grooves not completely obliterated. The gravel near the junction with the inter-kame sands sometimes contains well-glaciated cobbles.

The gravels consist of a great mixture of material. Some of the constituents are no doubt derived from older drifts and boulder clay; and thus rare specimens may be found which have come from any direction, but the essential constituents have been brought from the south and south-west. The large boulders in the middle and at the western end of the kames are mainly sandstone and conglomerate from the Old Red Sandstone, carboniferous sandstone, and Tinto felsite. At the north-eastern end the largest boulders are of basaltic rocks from the hills to the east and south-east. The smaller boulders and cobbles include many graywackes and cherts from the Southern Uplands and andesites from the Old Red Sandstones. A few pebbles and cobbles occur of unmistakable Highland schistose grits and gneisses; these northern rocks appear to be very irregularly distributed, for I have found several in a pit on one occasion, and been unable to find any at the same pit on a subsequent visit. These northern rocks have probably been derived from the local boulder clay.

That some of the material came from the south-west is shown by the presence of Coal Measure sandstones which must have been derived from the Douglas coalfield; and the abundant coal in some layers of the sands at Carstairs and Hyndford Bridge has probably come from the same source.[1]

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[1] Mr. James Stark informs me that he has found in the kames rocks from the Coal Measures of the Douglas coalfield.

The composition of the kame gravels is indicated by the following table :—

Rocks represented.		From the eastern part; pebbles and cobbles from 1 to 3 or 4 inches in diameter; gravel pit on the Wilsontown road half a mile NNW. of Carnwath Station.	From the western part; gravel pit east of western White Loch, and half a mile west of Carstairs.
Coal Measure faikes, sandy shales,		1	...
Carboniferous sandstones (mostly white; one greenish; one or two stained slightly brown),		11	3
Calciferous sandstone (?); green sandstone,		2	...
Old Red Sandstone—red and brown sandstones,		49	30
Do.—quartz conglomerate,		1	...
Graywacke and graywacke sandstones	from Southern Uplands.	4	30
Slaty shale,		1	...
Chert,		6	...
Vein-quartz,		2	...
Schistose grits; Highland rocks,		0	2
Basalt one very decomposed, and two fine-grained,		5	1
Tinto felsite,		9	34
Andesite and a few andesitic tufts,		13	

3. *The Age of the Kames.*—The age of the kames is unquestionably later than the boulder clay, since they rest upon it near Newmill; and it is strewn with patches of kame sand and gravel. The kames have been greatly denuded since their formation, especially at their south-western end.

III. The Inter-Kame Sands.

It has been usual to include as part of the kames a series of sand-hills which lie mostly to the south of the road from Lanark to Edinburgh. In places the kame gravels pass to the south of that road, as in the wood north-east of Columbie, nearly half a mile north-east of Carstairs village; and a mile further east, in the ground to the south of White Loch, the kame gravels extend south of the road and form the conspicuous summit (altitude about 770 feet) north of the site marked on the six-inch maps as Fieldland. On the southern border of the kames at this locality is a layer of gravel with glaciated stones; and this fact indicates a somewhat different condition of deposition. This southern boundary of the kame gravels here trends north-eastward; it passes to the south of the bank at 708 feet, where the road to Carstairs Junction leaves the main Edinburgh road. To the south of this south-eastern lobe of the kames the hills consist of sand, which can be seen around Fieldland and the wood to the east of it. The sand contains pebbles in the upper part, but it is usually free from stones.

These sands are well shown in the large sandpit of the Coltness

Iron Company, in the ridge which extends to the north-west of Carstairs Junction to the site of Carstairs Castle and the farm of Columbie. The sandpit shows about 50 feet of well-bedded sand, in the upper part of which are numerous small pebbles; the sand includes large boulders, many of which have well-preserved glacial striæ. Some seams are black with coal fragments. Some of the layers are false-bedded and current-bedded.

Another good exposure of these sands occurs in the pit beside Carnwath Station. It shows 30 to 40 feet of sand which is in places complexly false-bedded. It is mostly free from pebbles; it includes many boulders 3 feet long, and one of basalt which is 6 feet by 4 feet by 4 feet. The boulders are mainly basalts and Old Red Sandstone. As some of them have well-preserved glacial striæ, they must have been carried to their present position by floating ice. The common pebbles are Tinto felsite, andesite, jasper, chert, Markle basalt, coal shale, Coal Measure sandstone, and vein quartz. These sands also form the hills in the Carnwath Golf Course, where they rise to about a height of 750 feet. These sands never reach the height of 770 feet, which was apparently the general level of the original crest of the kames. The sands extend south of the Carnwath Golf Course through Winterlaw Wood, and are seen in the sandpit in the Lampits Burn, just north of the railway to Dolphinton. The sands are best exposed here in a cliff about 60 feet high, in the bank of the Clyde to the south-east of Lampits. The upper part of this section is at the level of about 680 feet.

Another exposure of the sands is in the railway pit to the south-east of Newhouse, and in the railway sections west of Carstairs Station.

During the recent enlargement of that station (1915) a good section was exposed of finely bedded clays, which afford clear evidence of deposition in the quiet waters of a lake.

IV. The Formation of the Kames.

The first widely accepted theory of the origin of kames regarded them as marine deposits formed by the action of strong tides or currents. The weakness of this theory was demonstrated by T. F. Jameson (1874, p. 326), who then classified some kames as terminal moraines of coarse gravelly débris. He described kames in general (p. 329) as due to sheets of gravel that had been deposited by streams along the margin of glaciers and then forced up into mounds by a re-advance of the ice. Though he spoke of them as moraines he clearly recognised their fluvio-glacial deposition.

The essential facts regarding the kames of Carstairs which require explanation are that the kames are composed of a great mixture of rocks, that they were deposited by water, that their characteristic constituents have come from the south and south-west, and that the kames were laid down as a ridge of gravel, of which the base was on an average at the height of about 700 feet and its crest at about 780 feet.

These characteristics, with the exception of the second, would be consistent with the formation of the kame as a moraine. But since its

materials were deposited by water, it is not a true moraine, as was pointed out by Sir Archibald Geikie (1901, pp. 402-3). "That they are not the ordinary moraines of glaciers, as some geologists have imagined, seems to be conclusively indicated by the general absence of angular rubbish, by the well-worn water-rolled character of the stones, and by the stratification which is almost everywhere visible in them, when a sufficiently large section is exposed. They seem to point to abundant streams of running water from the rapid melting of snow and ice." Mr. John Smith also lays emphatic stress on their deposition by water, for he represents them as delta deposits rearranged by streams (1901, p. 526).[1]

As the kame is a long ridge of fluvioglacial gravel it is natural to compare it with an esker, and some parts of its course, where the confluent ridges surround closed hollows, strikingly resemble some typical Swedish eskers (ösar). In a discussion of the relation of kames and eskers I adopted (1912) the definitions that eskers are ridges which have been deposited at the mouths of glacial rivers discharging from a receding ice-sheet or glacier and which trend at a high angle to the margin of the ice; and that kames are fluvioglacial or glacieluvial deposits along the margin of a receding ice-sheet or glacier. There appears no trace in the kames of Carstairs of the transverse seasonal banding[2] found in some Swedish eskers: and the kames were obviously laid down across and not along the main drainage lines existing during their formation, and were due to floods of water set free by the melting of the ice. Owing to the irregular retreat of the ice-front and the variable discharge of the streams, the kame material was piled in irregular and confluent ridges.

The ice which deposited the kames of Carstairs seems to have belonged to two glaciers, which came from the Southern Uplands and spread over the low ground of the Clyde valley between Carnwath and Cleghorn. The larger glacier descended from the upper Clyde valley (fig. 2, C. G.). It must have been joined by another from the Douglas Water. The recession of the ice-front left between it and the kames a depression which was occupied by a lake, wherein were deposited the interkame sands and the lacustrine clays of Carstairs Junction: and melting icebergs dropped the large striated boulders which occur in the sands. The relation of the kames to the upper Clyde glacier, according to this interpretation, was illustrated in a diagrammatic section issued in 1912 (Gregory, 1912 (2), p. 214).

V. The Glacieluvial Kames of Stallashaw and Thankerton.

Sir Archibald Geikie's account (1873) of the kames of Carstairs suggests their connection with those at Stallashaw Moss and Thankerton.

[1] James Geikie (1894, p. 190), using the term moraine in a wider sense, described the kames of Carstairs as "of morainic and fluvioglacial origin."

[2] The presence of this structure in some Swedish ösar is remarked by Mr. W. B. Wright of the Geological Survey of Ireland (1914, p. 38). Mr. R. W. Durdle has sent me a sketch of an esker at Athenry showing that this banded structure occurs in some of the Irish eskers.

These two kames seem to me independent and different in character. The kames of Stallashaw Moss are in the upper part of the North Medwin valley; they are marked on the Geological Survey Map, Sheet XXIV., and on the Ordnance Map, six-inch, Lanarkshire, Sheet XX. NE. The kame is a little over a mile in length from Easter Yardhouse across the Greenfield Burn to Blackcastle. Its altitude above sea-

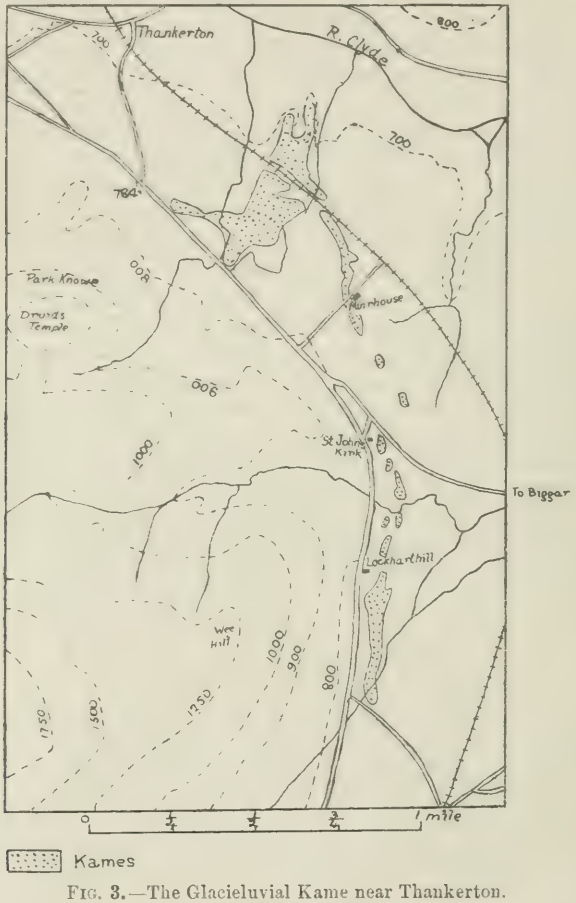

FIG. 3.—The Glacieluvial Kame near Thankerton.

level is from about 850 to 900 feet, and it dies out at each end against the sides of the Medwin valley. The trend is north-east and south-west, but its line is sinuous, and it is bent eastward at both ends. At its southern end it is about 50 yards wide, and from 10 to 25 feet high. It contains numerous large angular boulders of basalts and sandstone, and abundant pebbles of the Tinto felsite, Southern Upland graywacke, Carboniferous sandstone, and quartzite pebbles derived from the Old Red Sandstone; and some of these quartzites must

have come from beside powerful faults as they have been shattered and re-cemented. Many of the stones have well-preserved glaciated forms, but they are not striated.

The general characteristics of this kame show that it is glacieluvial (1912, No. 1, p. 210) and not fluvioglacial. It appears to have been formed by a glacier which descended into the Medwin valley from Harrow Law, at the south-west end of the Pentland Hills. It had no direct connection with the kames of Carstairs, from which it was separated by the ridge between the Medwin and Mouse Water valleys.

The Thankerton kame (fig. 3) in the Clyde valley, south of Carstairs, crosses the Caledonian Railway two-thirds of a mile south-east of Thankerton station. It is about two miles long and lies along the eastern foot of the Tinto Hills from Park Knowe to Wee Hill. It begins at the level of 780 feet, beside the Lanark-Carlisle road, as two low undulations, which pass eastward into the higher ground of Holm Braes. Two ridges pass eastward across the railway to a golf course on the left bank of the Clyde opposite Quothquan Law. The kame is best developed between Holm Brae and Muirhouse, as it is there a continuous narrow ridge from 20 to 30 feet high and 20 to 30 yards wide. At Muirhouse its structure is shown in a gravel pit. Further south it is continued by a line of disconnected mounds, to the east of the Carlisle road, past the cemetery of St. John's Kirk and Lockhart Mill, half a mile south of which it disappears at the level of about 780 feet.

This kame is composed of coarse, unstratified gravel and sand. The stones and boulders are not striated, but their faceted subangular form shows that they had not been carried far by water. The gravel contains a very high proportion of Tinto felsite, and this is more angular than the other constituents, of which the most numerous are graywacke, black chert, jasper, various basalts, and porphyrites. The course of the kame is crescentic, and it lies opposite the mouth of the valley on the eastern face of the Tinto Hills between Park Knowe and Wee Hill, and the kame is due to a glacier which flowed down that valley. As the ice melted, its load of earth and stones was deposited along its edge: but as the material was deposited by water and not directly dumped by the ice it formed a glacieluvial kame at the eastern foot of the Tinto Hills.

REFERENCES.

GEIKIE, Sir A.

1863. "On the Phenomena of the Glacial Drift of Scotland," *Trans. Geol. Soc. Glasgow*, vol. i., pt. ii., pp. 1-190. Map.

1873. In *Memoirs of the Geological Survey, Scotland*. "Explanation of Sheet 23." 107 pp.

1901. *The Scenery of Scotland viewed in connection with its Physical Geology*. Third Edition. xx + 540 pp. iv. pls.

GEIKIE, J.

1894. *The Great Ice-Age and its Relation to the Antiquity of Man*. Third Edition. Pp. xxviii + 850. 18 Maps and Charts.

GREGORY, J. W.
1912. (1) "The Polmont Kame, and on the Classification of Scottish Kames." *Trans. Geol. Soc. Glasgow*, vol. xiv., pt. iii., pp. 199-218, pl. xxvii.
1912. (2) "The Relations of Kames and Eskers." *Geog. Journ.*, vol. xl., pp. 169-175.
1915. "The Geology of the Glasgow District." *Proc. Geol. Assoc.*, vol. xxvi., pt. 3.
JAMESON, T. F.
1874. "On the Last Stage of the Glacial Period in North Britain." *Quart. Journ. Geol. Soc.*, vol. xxx., pp. 317-338.
RAMSAY, A. C.
1872. *Physical Geology and Geography of Great Britain.* Third Edition. xii + 349 pp. Map.
SMITH, J.
1901. "The Drift or Glacial Formation of the Clyde Drainage Area." In *Handbook on the Natural History of Glasgow and the West of Scotland, issued for British Association Meeting in Glasgow*, pp. 520-527.
WRIGHT, W. B.
1914. *The Quaternary Ice Age.* xxiv + 464 pp. xxiii pls.

THE AUSTRALASIAN ANTARCTIC EXPEDITION, 1911-1914: SUMMARY OF RESULTS.[1]

By Sir DOUGLAS MAWSON, D.Sc., B.E.

1. *Ground Covered.*—Extensive sledging journeys in Adelie Land, King George Land, and Queen Mary Land. The aggregate mileage of all journeys, including supporting parties, exceeding 4000 miles.

2. The use of wireless telegraphy in fixing a fundamental meridian in Adelie Land.

3. The portion of the continent south of Australia is of the nature of a high plateau, rising to heights of 3000 feet within twenty miles of the coast, but continuing steadily to rise further to the south.

The coasts are, for the most part, of the nature of ice-cliffs, the ice-cap at the sea face usually riding on a rocky bottom. Only occasionally do rocky capes break the monotony of the ice.

4. Floating extensions of the land ice are met with at intervals; sometimes as tongues from the valley depressions of the borders of the continent; at other times as immense floating ice aprons bordering the coast. The most notable of the latter, the Shackleton shelf, extends 180 miles from the land.

5. A notable feature of much of the coast is fringing islets, either partly or wholly of rock, or capped with ice.

6. The continental shelf is remarkable for its inshore trough. This

[1] This Summary was to have formed part of the article on the Australasian Expedition which appears on p. 337, but was delayed in transit.—ED. *S.G.M.*

appears to be a regular feature of the coast. The sea-floor at first deepens on passing out to sea, then shoals again before it finally plunges down into the ocean depths.

7. The ship's party carried out extensive oceanographic investigations. Amongst other things a very large number of deep-sea soundings were made.

8. Biological collections have been made at each of the three land bases. Numerous dredgings were made on the Antarctic continental shelf and in the deeper waters of the slopes further off shore. Amongst the land collections were the eggs of the Antarctic petrel and silver-grey petrel, recorded for the first time: also several new birds and their eggs. At Macquarie Island a special study was made of sea-elephants.

9. The rocks of Adelie Land and Queen Mary Land proved to be for the most part very ancient gneisses and schists. At Cape Hunter, in Adelie Land, an ancient sedimentary series, in part phyllite, is to be seen. On the coast of King George Land there extend for many miles rocky cliffs 1000 feet in height. The upper half of these cliffs is columnar dolerite: below is a sedimentary series containing bands of coal and carbonaceous shales. Elsewhere granite, gneisses and schists occur. Fragments of lignite were dredged up at several points along the Antarctic coasts.

At Macquarie Island the predominant rocks are of an igneous series: gabbro is most in evidence. Everywhere the island has been overridden by ice, leaving behind many small glacial lakes and a mantle of till.

10. The simultaneous records obtained by three stations, each about 1000 miles apart in an entirely new sphere from which no figures have before been returned, are of great value. The weather conditions were "wirelessed" from Macquarie Island to the Commonwealth Weather Bureau, Melbourne, every day for two years. During a part of the time it was possible to do the same from Adelie Land.

The climate of Adelie Land was found to be the most terrific ever recorded. There the average wind velocity for the year proved to be 50 miles per hour. It sometimes blew at 90 miles per hour for a whole day, and often exceeded 100 miles per hour for short periods. On one occasion 116 miles were recorded in a single hour. When the wind came down in cyclonic gusts the puff-velocity often exceeded 200 miles per hour. The instrument used for ascertaining the average hourly velocities was the self-recording Robinson cup anemometer.

11. An unusually extensive magnetic record was obtained, including continuous magnetograph curves for eighteen months at Cape Dennison. The latter is the nearest station to the south magnetic pole yet established. A series of careful field determinations were made to within a few miles of the magnetic pole. In conjunction with the magnetic and wireless observations systematic records of the Aurora Polaris were made.

12. In Adelie Land special account was taken of bacteriology.

THE TWEED VALLEY AND ITS RELATIONS TO THE CLYDE AND SOLWAY.

By Professor J. W. Gregory, D.Sc., F.R.S.

(With Sketch-Map and Sections.)

Introduction.

The Clyde has two remarkable features. It is the chief of those exceptional British rivers which flow north-westward; and its upper valley is joined to that of the Tweed between Symington and Biggar by a gap which is so low that the two rivers are said sometimes to join and fish to pass from one into the other: and certainly an embankment a few feet high would divert the Upper Clyde into the Tweed. The existence of this gap led Sir Archibald Geikie (1865, p. 288, 1901, p. 378) to suggest that the Upper Clyde had once passed to the sea through the Tweed: and this conclusion was adopted by Mackinder (1902, p. 132), who remarks that this change was the last great river capture by the usurping Clyde. In a recent paper on the Loch Long valleys I also adopted this view and, extending Mr. Cadell's explanation of the valleys through the Dumbartonshire Highlands, concluded that streams from the north-west of Loch Fyne once passed south-eastward across the Glasgow district and through the Clyde valley into the Tweed. The Clyde can only have had its outlet through the Tweed when it crossed the site of the Clyde estuary about 1000 feet above present sea-level. I did not, however, in that paper (1915) attempt to explain some obvious difficulties in the former passage of the Clyde through the Tweed, or use the evidence given by the Tweed valley as to the date when the rivers were thus connected.

The first difficulty is that though the Biggar gap is broad enough to have served as the outlet from the Clyde, the Tweed valley becomes so narrow further to the east that it may appear too small to have given passage to so great a river as the Clyde.

I. The Clyde-Tweed Problem.

1. *The Four Sections of the Tweed.*—For convenience of reference it is advisable to consider the Tweed valley as composed of four sections:—1. The Biggar Water (fig. 1, B. W.), which falls from 656 feet at the divide from the Clyde to 610 feet at its confluence with the upper Tweed near Drummelzier; 2. the Upper Tweed (fig. 1, U. T.), from the head of the stream by the Moffat road (altitude 1334 feet) near Clydelaw, to its junction with the Biggar Water at Drummelzier; 3. Middle Tweeddale, which, though sinuous, has a resultant easterly course from Drummelzier (610 feet) to Dryburgh (altitude 220 feet); 4. the Lower Tweed (fig. 1, L. T.), which from Dryburgh has a general course to the east-north-east and flows through a broad open drift-covered valley to the North Sea at Berwick.

2. *The Tweeddale Drifts.*—The drifts include three kinds, moraines, boulder clays and fluvioglacial gravels. Moraines are numerous and well

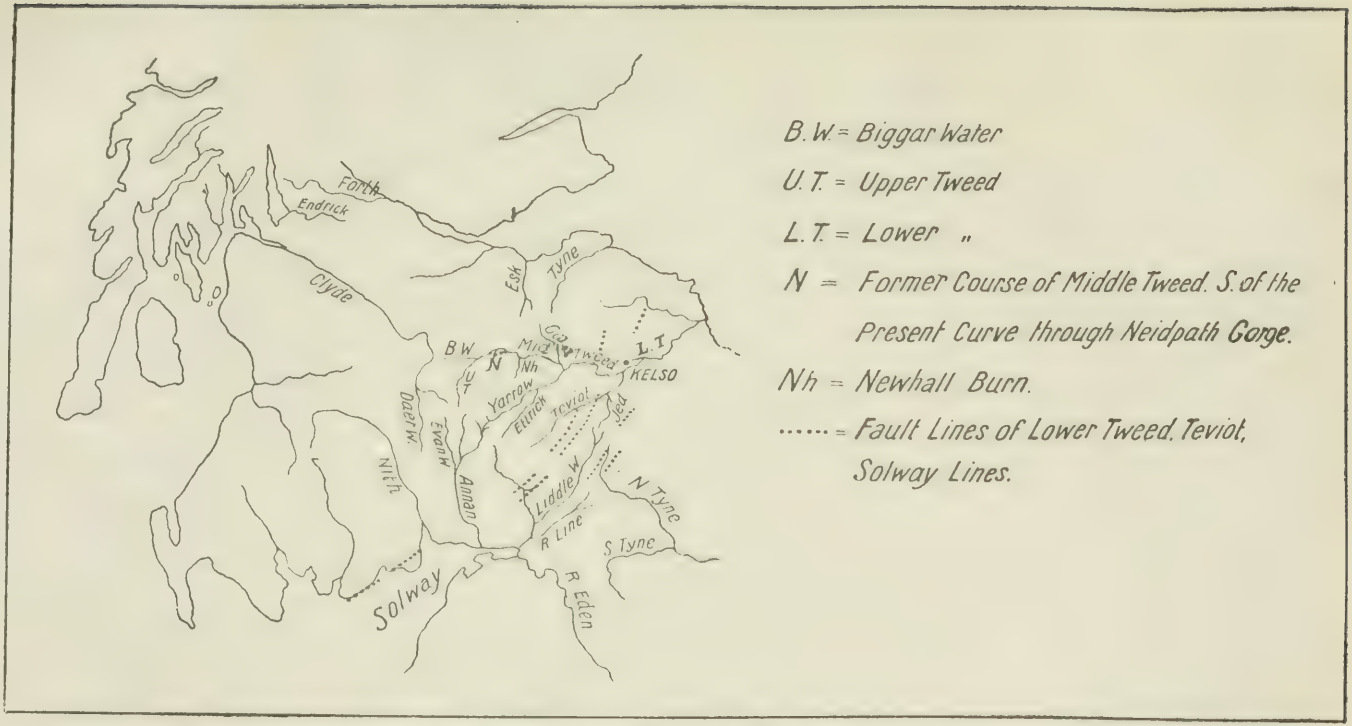

Fig. 1.—River valleys of southern Scotland. Scale 1" = about 13 miles.

developed on the floors of the tributary valleys, as for example on the Yarrow valley below St. Mary's Loch. They occur at the heads of many of the smaller tributaries, as at the head of Newhall Burn, south of Innerleithen. I do not, however, recollect seeing any moraine in the valleys of the Biggar Water or of middle or lower Tweeddale.

Boulder clay is widely distributed across the country both over the hills and in the valleys. In the wide basin of the lower Tweed below Dryburgh the boulder clay forms a wide expanse of drumlins, which are sub-parallel, with a general trend from south-west to north-east. These drumlins can be well seen from the roads which cross them at right angles, as for example between St. Boswells and Jedburgh. The boulder clay is especially well exposed in the deep sections on the banks of the Jed below Jedburgh.

The regularity in direction of the drumlins is well shown on the hill-shaded maps; and this feature has led to the opinion that their form is due to their original deposition. Their trend is however oblique to that of the main ice-movement across the lower Tweed; for, according to Sir Archibald Geikie (1901, pl. iv.), the ice from the central part of the Southern Uplands flowed first towards the east-north-east across the middle Tweed valley; then it moved eastward so that for a short distance above Coldstream its direction was parallel to the course of the Tweed; and then, as the lower Tweed turns north-eastward, the ice crossed the valley in places almost at right angles. Hence the ice movement was across the trend of the drumlins in the district where their form and arrangement are most regular. Moreover, post-glacial denudation in this part of Scotland has been so considerable that it would be strange if the soft boulder clay anywhere retains its original surface.

The fluvioglacial deposits often rest on the boulder clay and are certainly of later date. They are well developed on the floor of the Tweed valley, between Drummelzier and Peebles, and continue down the Tweed to St. Boswells. They consist of sheets of gravel, composed of stones which have been washed out of the boulder clay. They often contain many boulders a foot or more in diameter; these have all been well washed, so that they retain no trace of glacial striation or grooving. The gravels often form long rounded mounds and ridges or kames, of which the form is sometimes identical with that of drumlins; and when these kames are especially long and narrow they resemble eskers, but I have not seen in them any transverse banding. The kames often include layers of sand which are strongly false-bedded.

That the fluvioglacial gravels have been derived from the boulder clay is especially well shown in the Yarrow valley. Its upper part is a broad glaciated trough-valley, which is bare above St. Mary's Loch, for the loose material has been swept away by the ice. The chief drifts on the floor of the upper valley are deltas due to lateral streams, such as that which has now cut off the Loch of the Lowes from St. Mary's Loch. Below St. Mary's the floor of the valley is crossed by moraines, and covered by sheets of boulder clay. Further down, at Yarrow, occur sheets of fluvioglacial deposits of which the pebbles have been washed out of the boulder clay. Beds of stratified

drift, which are twenty to thirty feet thick and rest on the boulder clay, are exposed on the southern bank of the Yarrow below Yarrow school: and at Old Tinnis, on the northern bank, these gravels form kames, from fifteen to twenty feet high. North-west of Newark Castle, the Yarrow has cut a young gorge through rock, and the old channel is occupied by a line of kames (altitude 550 ft.), which is crossed by the road between the two bridges over the Yarrow. At Philiphaugh the kames are succeeded by wide sheets of sand and loam derived from the moraines and boulder clay.

3. *The Drift Blocked Valley of the Middle Tweed.*—The Biggar Water flows through a wide level trough-valley, which has a gradient of four feet in the mile and is so large that it presents no difficulty to the passage of a great river from the west; but below the confluence of the upper Tweed and the Biggar Water the valley contracts, has steep banks, a sinuous course, and overlapping spurs. Views along middle Tweeddale suggest doubt whether it could have accommodated a river much larger than the present Tweed. Thus after Drummelzier,[1] where the valley goes north-eastward for three and a half miles past Stobo, the valley is smaller than those of the Biggar Water and Clyde. Closer examination of this section of the valley removes the difficulty: for though the valley floor is only from a quarter to half a mile wide, it was once wider. The 600 feet contours are in places only a quarter of a mile apart and the 700 feet contours from half to three-quarters of a mile apart. The valley, however, is wider than that of the Clyde near Lanark; and it was formerly much larger, for one or both banks as well as the floor are formed of glacial drifts, the deposition of which has greatly reduced the size of the valley.

The apparent narrowing of middle Tweeddale at various localities between Stobo and Caddonfoot is therefore only of glacial age. Near the confluence of the Lyne Water typical kame gravels form ridges parallel to the Tweed valley, and occupy a width of about three-quarters of a mile. They are of the same width further east near Caverhill, and lower down become still wider at the mouth of the Manor valley.

4. *The Tweed Diversion at Peebles.*—The progress of the Tweed as it approaches the Manor valley, however, appears blocked by Cademuir Hill; but the river makes a sudden bend to the north-east and escapes through a deep gorge past Neidpath Castle to Peebles (fig. 1 N.). The valley is so narrow, the 600 feet contours being in one place only 180 yards apart, and the sides so steep that the railway passes through a tunnel; but some drift is present on both slopes, and the tunnel was cut through sand, gravel, and laminated clays (J. Geikie in *Geol. Surv. Memoir*, sheet 24, 1869, p. 19). Hence the Neidpath gorge was preglacial. It is, however, too small to have served as the outlet for the combined Clyde-Tweed river, which probably flowed up the Manor valley and to the south of Cademuir Hill. The gap between Cademuir and Canada Hills is a low depression, of which the height is between

[1] A fine corrie on Clover Law and another three-quarters of a mile east-north-east of Broughton smithy are seen from above Drummelzier, and are examples of those comparatively exceptional corries which face the south-west.

680 and 690 feet above sea-level, and as it is in drift the rock bed is lower. The 700 and 800 feet contours there are in places respectively 100 yards and 730 yards apart. The same contours in the Neidpath gorge are 400 and 630 yards apart. Hence at the level of 700 feet the gap south of Cademuir Hill is at present narrower than the Tweed valley at the same level, and it is only above the 800 foot contour that the greater width is with the older Cademuir valley. There is probably a wide, deep drift-filled channel which was formerly used by the Tweed; hence the Clyde could have escaped eastward without going through the Neidpath gorge.

Below Peebles the Tweed valley gradually widens, and the fluvioglacial drifts become very extensive. Two miles east of Peebles the road passes over a kame. Rock is exposed here and there on the banks of the river, as at the sharp bend near Cardrona station, where rock is exposed for nearly a mile along the road on the left bank; a little lower down, before Traquair, rock exposures occur also on the right bank.

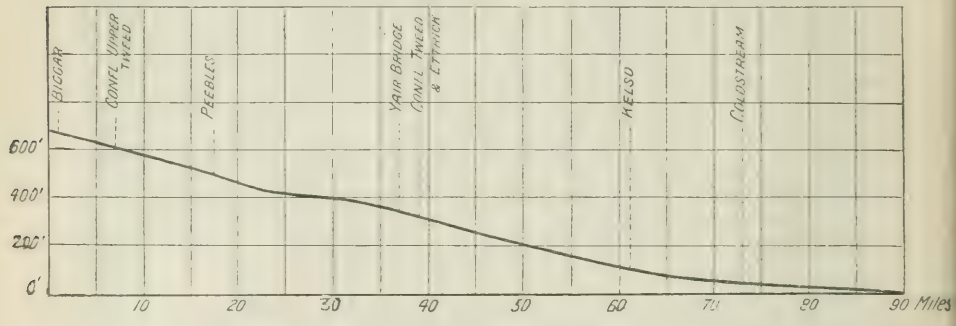

FIG. 2.—Gradient of the Tweed from the head of Biggar Water to the sea.
Vertical, 1 inch = 800 feet.
Horizontal, 1 inch = 20 miles.

The Tweed valley continues past Innerleithen with a sinuous course round successive spurs. The valley floor is in drift, but with occasional outcrops of rock on the lower banks. The most striking narrowing of the valley is at Caddonfoot, where the left bank is a steep glaciated cliff (fig. 3 c); but the right bank has a long gentle slope; the valley at the contour of 500 feet is 660 yards wide; at 600 feet it is 830 yards wide, and at 700 feet it is 1200 yards wide.

5. *The Gradient of the Tweed.*—That the Tweed is a very old valley is shown by its gradient, which for an upland river is unusually gentle and regular (fig. 2). The Biggar Water has a fall of only 4½ feet to the mile. The upper Tweed between Drummelzier and the pass to the Annan valley falls 45 feet to the mile, or ten times as much as the Biggar Water. In this, as in some other respects, the valley of the upper Tweed appears to be tributary to that of the Biggar Water (fig. 2).

The average gradient of the Tweed for the ninety-one miles between the head of the Biggar Water and Tweedmouth, is a little over seven feet per mile. The lowest thirty miles has the average gradient of three

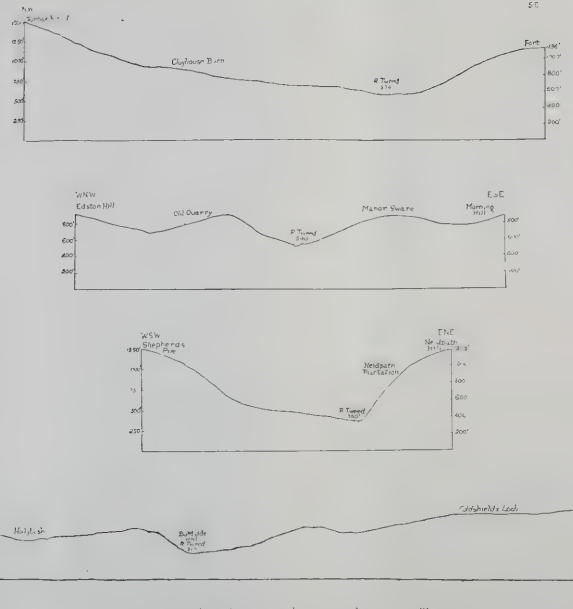

Fig. 3.—Sections across Middle Tweeddale. Vertical scale twice the horizontal.

a. Section across Tweeddale near Stobo, with a steepened northern slope.

b. The undulating widened floor of the valley near the confluence with the Manor Water above Peebles.

c. Section across the valley near Caddonfoot, with the steepened right bank.

d. Section across the valley below the confluence with the Ettrick Water, showing that the present valley has been cut on the floor of an older, wider valley.

feet to the mile. The steepest fall is only thirteen feet to the mile, as between Yair Bridge and the confluence of the Tweed and the Ettrick.

Transverse sections across middle Tweeddale afford clear evidence of the rejuvenation of the river. The typical views along it include the long gentle slopes of an old high-level valley, and their sudden steepening to the main walls of the present valley. This steepening is illustrated by the transverse sections which have been kindly drawn by Mr. J. V. Harrison (fig. 3).

6. *Changes in Progress in the Tweed Basin.*—This rejuvenation happened in recent geological times; and consequent changes in the Tweed basin are still in progress. Thus the Tweed is encroaching on the Yarrow and losing ground to the Forth. The Yarrow has the general aspect of an old valley, but its great width is partly due to its having developed along the strike of the country. It is now being reduced in area. Thus the head of the Newhall Burn (fig. 1 Nh), which joins the Tweed from the south at Innerleithen, is a deep gorge that has been cut through the moraines on the divide between the Tweed and Yarrow. These are still more extensive to the south of the pass, in the upper part of the valley which descends past Mount Benger to the Yarrow near the Gordon Arms. The upper part of this valley is broad and shallow, and is clearly older than the gorge of Newhall Burn which is encroaching on it from the north. The Yarrow valley is being similarly reduced at its head. It begins as a wide valley, with the river flowing through a slight depression on the floor; whereas immediately across the divide at Birkhill the Moffat Water has cut a deep post-glacial gorge which it is extending north-eastward; as the Moffat Water has the shorter course to the sea it is enlarging its basin at the expense of the Yarrow.

This process is also in progress at the Devil's Beef-tub to the north of Moffat; the Annan river has excavated there a deep gorge, which is one of the most famous incidents in the scenery of the Southern Uplands; and the Annan is still extending its basin northward by cutting a deep notch into the upper Tweed valley, which ends abruptly, high above the gorge of the Annan. The Tweed is also losing ground to the Forth, as the Tyne is invading the upper valley of the Gala.

7. *The Slight Amount of Glacial Corrosion.*—One interesting feature in the Tweed valley is the comparatively limited extent to which it has been deepened by glacial corrosion (*i.e.* vertical deepening). The hills were more affected by the ice than the valleys. The whole country was ice-covered, and the peaks have been rounded, the ridges lowered, and the slopes flattened where the ice pressed heavily against them. Pirncraig, just east of Innerleithen, is a striking example of the ice-planed hillsides. This spur projected into the valley between the Leithen and the Tweed; and the ice descending from the west was forced against both slopes of this ridge, and has worn it into the form of a smooth-sided wedge. The valleys, however, have been comparatively slightly affected. The Tweed below the Biggar Water has maintained its meandering course; it has not been betroughed, and it was clearly not much deepened by the ice, since its tributary valleys are on the same grade. The main ice-flow in this district was from west to east, and Tweeddale therefore afforded

the easiest outlet for the ice ; but the limited corrosion in it by the ice is shown by the absence of hanging valleys.

8. *The Age of the Clyde-Tweed.*—The low even gradient of the Tweed valley, and the occurrence of its most level section, with the exception of the lowest twenty miles, at its head in the Biggar Water, are evidence of the antiquity of the Tweed valley ; the dates of its excavation must remain uncertain until the age of the plant bed at Ardtun in Mull is fixed more definitely. This bed was originally regarded as Miocene, and then as Lower Eocene, or possibly even Upper Cretaceous. I formerly regarded it as not later than Oligocene ; but the information on which I relied as definite evidence of the pre-Miocene age proves fallacious. The bearing of these plant beds on the Tweed problem is that they give the only fossil evidence as to the date of the volcanic period and great uplift of north-western Scotland. The long basalt dykes which cross southern Scotland from north-west to south-east were doubtless intruded at the time of these volcanic eruptions ; and the erosion of the valleys of the Clyde and Tweed was later than the intrusion of these dykes. If the volcanic period were Miocene, the formation of the Clyde-Tweed valley therefore began in the Pliocene ; but if the volcanic period were Oligocene the formation of these valleys may have begun in the Miocene. The latest date is fixed by the fact that, like all the main valleys in the Southern Uplands, the Tweed valley is pre-glacial.[1] The general aspect of the Tweed valley is that of a trench on the floor of a much older high-level valley (fig. 3 d), and the trench itself has in places such steep sides (fig. 3 c) that it would appear to be not very long pre-glacial. The present Tweed valley was probably cut in consequence of that Pliocene uplift which has greatly affected the physiography in many parts of Britain.

9. *Conclusions as to the Clyde-Tweed Connection.*—The evidence of the Tweed valley shows that there is nothing to forbid the conclusion that when the land around the Clyde estuary stood at about 1000 feet above present sea-level, the Clyde discharged eastward to the Tweed. For though middle Tweeddale may in places appear too narrow for the passage of a combined Clyde-Tweed river, the channel has been blocked by glacial drifts, through which the Tweed is re-excavating its valley ; or as at Neidpath, the narrow gorge now used by the river is a younger valley, and the original channel was through a broader gap now blocked by glacial material. In pre-glacial times the Tweed valley was quite large enough to have accommodated the assumed Clyde-Tweed river ; and the Clyde had been separated from the Tweed long before glacial times.

II. The Relations of the Tweed and Solway Valleys.

The second difficulty in the theory that the Clyde once discharged through the Tweed is that the lower Tweed, instead of continuing to the south of east, gradually bends until it flows north-east, and thus adopts

[1] Sir Archibald Geikie pointed out this fact for eastern Berwickshire in 1864, p. 51.

a course parallel to many of the subsequent or strike streams of the Southern Uplands.

The Tweed as a whole is not a strike river. From Peebles to Melrose it crosses the strike of the rocks at an angle of about forty degrees. It then crosses the Old Red Sandstone almost at right angles and passes obliquely across the Carboniferous rocks between Kelso and Berwick. Above and below Dryburgh the characteristics of the Tweed valley are very different. Instead of flowing through a deep trench which has been cut across the hills, the valley below Dryburgh is shallow and the river meanders across a wide sheet of drift. Sometimes, as at Kelso, the river impinges upon one bank, and then passes beside rocky cliffs; but most of the lower Tweed flows between low banks of drift and alluvium.

At Kelso the Tweed is joined by the Teviot, which comes from the south-west; it then flows more northerly, and after Coldstream it bends further till it goes to the north-east. Between Coldstream and Berwick the Tweed is in line with the main part of the Solway Firth, and is parallel to the Teviot, Yarrow, Ettrick, and other rivers, and to the important faults between Hawick, Riccarton, and Langholm. The faults have lowered bands of Old Red Sandstone and Calciferous Sandstones into the older rocks which form the Southern Uplands. The faulting was, therefore, later than some part of the Carboniferous, and was earlier than the basalt dykes which cross southern Scotland from east-south-east to west-south-west or south-east to north-west.

The faults trending from north-east to south-west are in line with the Solway Firth, which, like the lower Tweed, occupies a very ancient depression. The Solway valley has a complex history (*Geol. Mag.*, June 1915, p. 243), for it was initiated by earth movements of pre-Permian, Permian, and Triassic dates; and its enlargement in Kainozoic times was no doubt aided by earth-movements at the same period as the upraising of the Lake District and of the widespread thousand foot plateau in southern Scotland.

The lower Tweed valley is the north-eastern part of a depression across Scotland, of which the south-western end forms the Solway Firth. The lower Tweed, therefore, lies along a valley which was first formed when earth movements lowered slabs of upper Palæozoic rocks into the older Palæozoic foundation of the Southern Uplands; and it was re-excavated and enlarged in Kainozoic times by the denudation of the comparatively weak Carboniferous and Old Red Sandstone sediments. Hence the valley of the Teviot and lower Tweed is much older than that of the Biggar Water and middle Tweeddale; for while the latter is a consequent river of Kainozoic age, the Teviot-lower Tweed drains the eastern end of a depression which was initiated by earth's movements at the end of the Palæozoic, and was quickly renewed in consequence of the structure left by those ancient movements.

REFERENCES.

GEIKIE, Sir ARCHIBALD.

1864. "The Geology of Eastern Berwickshire (Map 34)." *Mem. Geol. Surv. Great Britain*, 34 *Scotland*. 58 pp.

1869. "Peeblesshire, with parts of Lanark, Edinburgh, and Selkirk." *Mem. Geol. Surv. Scotland*. Explanation of Sheet 24. 24 pp.

1901. *The Scenery of Scotland viewed in connection with its Physical Geology*. Third Edition. xxii + 540 pp., 4 pls. First edition, 1865.

GREGORY, J. W.

1915. "The Age of Loch Long, and its Relation to the Valley System of Southern Scotland." *Trans. Geol. Soc. Glasgow*, vol. xv., pp. 295-310, pls. xxxi-xxxii.

1915. "The Solway Basin and its Permo-Triassic Sequence." *Geol. Mag.* N.S. Dec. 6, vol. ii., pp. 241-249.

MACKINDER, H. J.

1902. *Britain and the British Seas*. xv + 377 pp., 6 pls.

OBITUARY: PROFESSOR A. J. HERBERTSON.

ANDREW JOHN HERBERTSON, M.A., of Wadham College, Professor of Geography in the University of Oxford, died at his residence at Chinnor on the 31st July. The death of his widow followed with tragic suddenness fifteen days later.

Professor Herbertson was born at Galashiels in 1865, and his earliest academic training was received at Edinburgh, where he came under the influence of Tait. His ability was early recognised by the great teacher of Natural Philosophy, who enlisted his aid in several of his scientific investigations. Thus, for example, Herbertson did much to bring the impact apparatus to its perfected form. In the laboratory at Edinburgh University he also laid the foundation of the meteorological work which was to prove one of his most valuable contributions to the science of geography. When in 1892, on the nomination of the University, he was awarded a research scholarship by the Commissioners of the Exhibition of 1851, he pursued his hygrometrical investigations at the Ben Nevis Observatory, the results of which may be found in the pages of the *Journal* of the Scottish Meteorological Society. His interests at this time were also directed towards oceanography, and he was responsible for the valuable report on the Physical Observations carried on by the Fishery Board for Scotland during 1893. At this period in his career he was closely associated with Dr. Buchan in the investigations upon which the great *Atlas of Meteorology*, published in collaboration with Dr. Bartholomew in 1899, was based. In compiling the data for this monumental undertaking the brunt of the work fell upon Mr. Herbertson, and the masterly manner in which it was carried through at once placed the students of the subject both in this country and in America under a permanent debt of

gratitude. Mr. Herbertson pursued his meteorological and geographical studies in Germany, and from the University of Freiburg in Baden he obtained the degree of Doctor of Philosophy, *multa cum laude*, his thesis dealing with the Monthly Rainfall over the Land Surface of the Globe. But perhaps it was to the work of French geographers, especially during his stay at Montpellier and Paris, that he owed the greater and more lasting intellectual and spiritual debt. The influence of the Le Play school in social economics and the work of French students in botanical distribution and plant association exerted a far-reaching effect upon Herbertson's development as a geographer.

In 1894, with the approval of the Councils of the Royal Geographical Society and the Manchester Geographical Society, he was appointed Lecturer in Geography at Owens College, Manchester. Later he became Lecturer on Industrial and Commercial Geography in the Heriot-Watt College, Edinburgh. He maintained a close connection with the activities of the Outlook Tower, and among the masters to whom he paid homage Professor Geddes held a foremost place, and to his influence and inspiration Mr. Herbertson constantly acknowledged his debt. While in Edinburgh he was an active member of the Royal Scottish Geographical Society; for several years he was a Member of Council, and in addition to frequently contributing to the *Magazine*, he undertook the duties of acting editor for a short period in 1897.

Dr. Herbertson's opportunity came when, in 1899, he was invited to Oxford to join Mr. Mackinder and Dr. Dickson in the work of the newly founded School of Geography. Twelve years before, with the aid of a grant from the Royal Geographical Society, a Readership in Geography had been established at Oxford, and much valuable work had been achieved by Mr. Mackinder, mainly in the field of historical geography. In 1899 it became possible to establish the study on a broader foundation by instituting a School of Geography. In the following year a statute was passed establishing a Diploma in Geography, the first examination for which took place in 1901. Dr. Herbertson was appointed Lecturer in Regional Geography, and later also Curator of the School. From the outset he took a large share in its development, and on the resignation of Mr. Mackinder in 1905 Dr. Herbertson was appointed Reader in Geography and Director of the School.

Much had already been accomplished by the brilliant efforts of the first Reader, but much still remained to be done; not only had the new Reader to prove his own worthiness for the office, but he had also to enlist sympathy for the study of geography from many quarters that still remained hostile, and to demonstrate its essential importance in the work of the University. The former proved the easier task; the latter task was much more difficult, but how completely and successfully it was accomplished is most clearly shown by the position which the School of Geography has attained, not only within Oxford itself, but also in the larger world beyond. In 1910, in recognition of his personal merit and of the value of his work in the University, Convocation passed a decree constituting Mr. Herbertson Professor of Geography in the University of Oxford so long as he held the office of Reader. There is at present

no endowment for a permanent professorship, and consequently the unique honour thus bestowed upon him is to be taken first of all as a personal tribute, but it also serves to indicate the important place he had obtained for the study of geography within the University. He was Recorder of E Section at the meeting of the British Association in South Africa in 1905, and in 1910 he was appointed President of the Section at the Sheffield meeting. In 1906 he was invited to sit on the Royal Commission on Canals and Waterways, and was able to render much valuable assistance in many of the problems that Commission was appointed to investigate.

His appointment to Oxford seemed to open up for Dr. Herbertson a unique opportunity of pursuing those scientific studies to which he was so devoted, and for which he was so supremely qualified, as a result of which he could certainly have bequeathed a heritage of scientific work of the first quality. But with his clear-sighted vision he realised that there was a more immediate need for improving, if not even for transforming, the conditions and methods of teaching the subject of geography. And he deliberately chose to postpone, and, as it has unfortunately proved by his too early death, practically to sacrifice his own schemes of scientific work in order to promote the interests of geographical education. It is betraying no confidences now to state that early in his Oxford career Dr. Herbertson was invited to take up a very important post in America, but he elected to remain in Oxford, although he was keenly aware of the magnitude and difficulty of the task to which he chose to devote himself. And whatever may be the final estimate of posterity upon the work he accomplished, it can be asserted, without fear of contradiction, that in the great development that has taken place in the study and teaching of geography during the last twenty-five years, no one has rendered more valuable and consistent aid than Professor Herbertson. As far back as 1895, at the sixth International Geographical Congress, held in London, he called attention to the importance of geography in secondary education, and pleaded for the adequate recognition of the subject. Some of his earliest contributions to this *Magazine* dealt with the problems of geographical education.[1] He prepared the very exhaustive report on the position of geography in the educational system which was presented to the Toronto meeting of the British Association in 1897. Two years later, at the request of the Manchester Geographical Society, he issued a statement on the Teaching of Applied Geography.

In Oxford he found himself in a position to attain many of the educational ends for which he had so long striven, and to exert a far-reaching influence upon the development of the subject in education; and he lived long enough to see some at least of his ideals being understood and realised in many directions. As a teacher he impressed his students by his own mastery of the subject in all its varied aspects and by the width of his sympathies. In his capacity as editor and writer he

[1] *Scottish Geographical Magazine*, vol. xii. p. 414; vol. xiv. p. 81; vol. xviii. pp. 124 and 256.

placed at the disposal of the teaching profession an enormous amount of the most valuable material; how great this service has been can be best appreciated by those teachers who understand the function and use of a text-book, and perhaps also by the growing army of imitators, whose work could never have seen the light but for the pioneer labours of Professor Herbertson. In educational cartography his work marked a new departure in this country. Much of his time and energy were ungrudgingly given to promote the interests of the Geographical Association, of which he acted as honorary secretary for many years, and from its first publication he was editor of the *Geographical Teacher*.

He was an active member of the Royal Geographical Society, and served upon its Council for several terms. To the Research Department he communicated those scientific contributions with which his name must always be associated. His paper on "The Major Natural Regions of the Globe"[1] was read in 1904, and seven years later he contributed his paper on the "Thermal Regions."[2] The idea of the natural region was more fully developed and applied in the paper on "Les Unités Supérieures," published in *Scientia*, vol. xiv., and also at the meeting of the British Association at Birmingham in 1913. In these papers, his most valuable and permanent contribution to the systematic and scientific study of the subject, not only did he suggest a method, he expounded an ideal—the ideal of synthesis, of sympathy, and of mutual co-operation, to which he looked to dominate the activities of man, and to mould his development in the present century, just as the ideals of analysis and individual struggle had directed human progress and relations in the past fifty years. And the development of this point of view was steadily becoming the dominant purpose of much of his teaching. Herbertson had formed a clear and definite conception of the higher units of which the earth with its complex life is composed, and he suggested a convenient classification and notation for these entities: but in no sense did he regard his own classification or nomenclature as final; he readily acknowledged that further investigation and criticism might lead to a somewhat different grouping of the units or a more suitable notation: his main purpose was to obtain the recognition of these higher units and what they represent, and in this he has been almost completely successful.

Among his many dreams and plans for the development of the School and the extension of its usefulness, he hoped to see established in Oxford a great geographical colonial institute: already the school has served an imperial purpose, not only by the facilities which, through its extensive library and valuable collection of maps, it offers to the traveller and colonial administrator, but also by the material assistance it has been able to render to the history schools of the university. Last year, under his joint editorship, and with his active co-operation, there was published the monumental and authoritative *Oxford Survey of the Empire*, which must remain the classic work on the British Possessions for years to come.

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[1] *Geographical Journal*, vol. xxv. p. 300.

[2] *Ibid.* vol. xl. p. 518.

He was fortunate to find in his wife a brilliant and sympathetic co-worker in many of his schemes. Much he hoped to do that must now remain undone, and that loss will be most keenly felt by those who best knew the man and shared his ideals and aspirations. But it is more fitting now to remember the work he has accomplished. The Oxford School of Geography, of which he has been aptly described as the "véritable apôtre et l'âme," has established a tradition of geographical teaching in this country, and has been the model for most of the schools that have arisen subsequently. He has left behind him the record of an all-too-short and strenuous life, spent in the service of the science of which he was an illustrious exponent, and he has bequeathed an ideal and an example which will remain a great inspiration to those who seek to follow along the paths he has made clear.

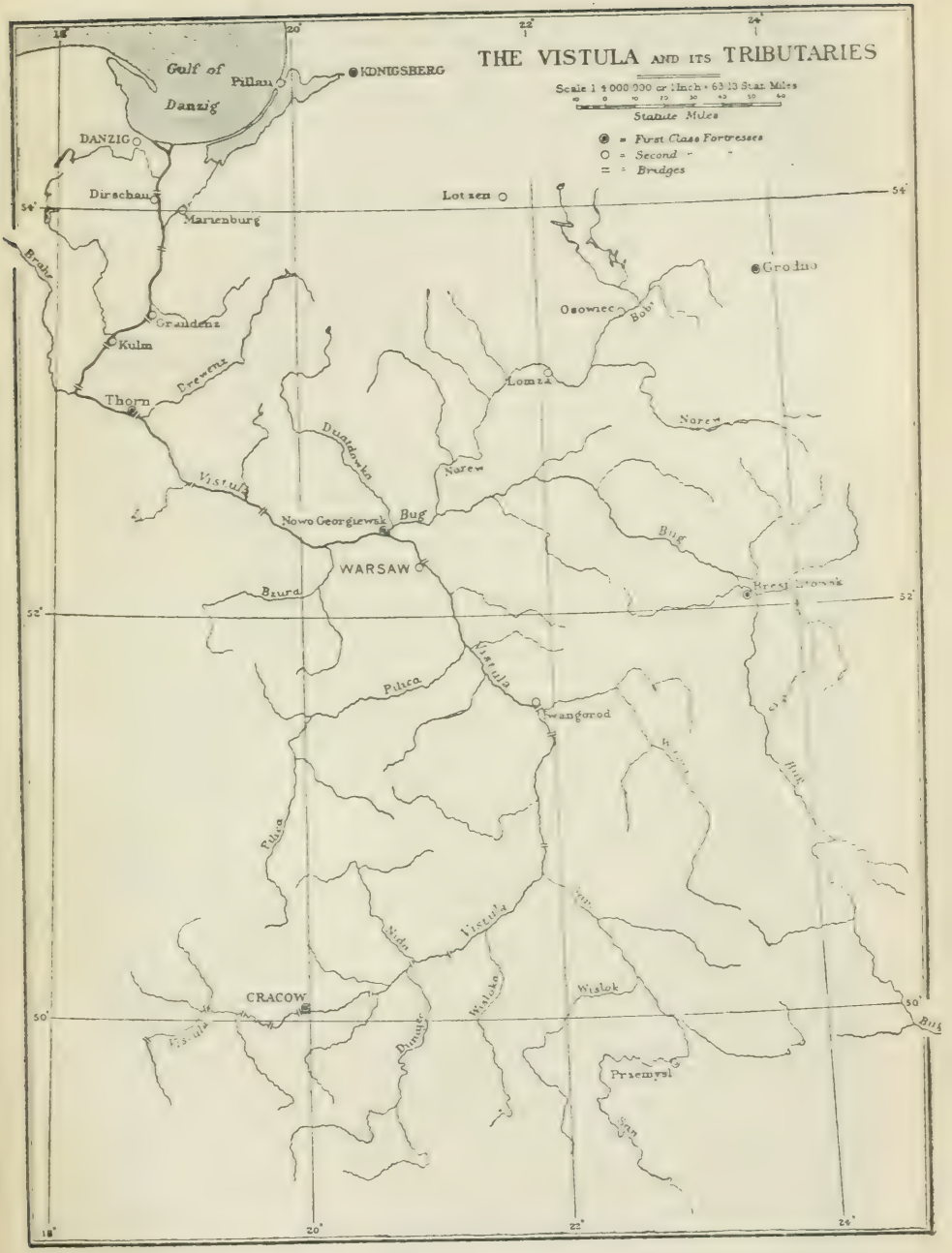
J. COSSAR.

GEOGRAPHICAL NOTES.

EUROPE.

Geography of the Eastern Theatre of War (*With Sketch-Map*).—Dr. Vaughan Cornish contributes to the May number of the *Geographical Journal* an interesting article on the historical and physical geography of the theatres of war, which is accompanied by a series of sections and sketch-maps, as well as by a coloured orographical map of Europe. The notes on Poland and the basin of the Vistula are especially interesting, and we reproduce by permission the sketch-map of the Vistula and its tributaries, showing a region which has been the scene of so much sanguinary fighting. Dr. Cornish points out that it is the river Vistula which constitutes the dominating physical feature of the area. The fact that this river in its upper reaches, together with its tributary the San, forms a northward-pointing salient is of great importance for Austria-Hungary. The angles of the triangle formed by the two rivers are guarded by the fortresses of Przemysl and Cracow. Przemysl stands on the right bank of the San and Cracow, at a distance of 130 miles, on the left bank of the Vistula. The latter town not only guards the approach to the Dukla and other passes through the Carpathians, and thus the road to the plain of Hungary, but also the Moravian or Oder gap, which leads directly to Vienna and Prague. Dr. Cornish goes on to point out that the lower reaches of the Vistula, which are in Prussian territory, and crossed by a number of railways, are all guarded by forts. "This chain of posts," he says, "secures the communications of troops acting in East Prussia, a country tactically strong for defence, but which without a line of fortresses on the lower Vistula would be strategically very weak, as it would be isolated if the Russians seized that line.

"Below the junction of the San and Vistula and above Thorn there are long reaches of the latter river without military works, but the position of the tributaries on the right bank has enabled Russia to


THE VISTULA AND ITS TRIBUTARIES
Scale 1 : 1 000 000 or 1 Inch = 63.13 Stat. Miles
Statute Miles
= First Class Fortresses
= Second "
= Bridges
Gulf of Danzig
Pillau
KÖNIGSBERG
DANZIG
Dirschau
Marienburg
Lotzen
Brahe
Graudenz
Kulm
Thorn
Drewenz
Osowiec
Bobr
Lomza
Narew
Grodno
Dunajewka
Vistula
Nowo Georgiewsk
Bug
WARSAW
Bzura
Brest Litowsk
Pilica
Wangorod
Nida
Wisloka
CRACOW
Dunajec
Wislok
Przemysl
San
54°
52°
50°
18°
20°
22°
24°

organise her western stronghold behind the middle Vistula, centred on Warsaw. The southern line is that of the Wieprz, which joins the Vistula on the right bank at the fortified town of Iwangorod. The northern line commences on the Bobr, on which is the fortified town of Osowiec. This river enters the Narew (on which is Lomza), and the Narew in its turn enters the Bug, at whose junction with the Vistula below Warsaw is the fortress of Nowo Georgiewsk. The Russian railways (from north-east and south-east, not from east on account of the great area of the Pripet swamps) converge on Warsaw; and Brest Litowsk, at the railway crossing of the Bug behind Warsaw, is fortified."

Structure of the Carpathians.—In the *Revue Générale des Sciences* for April 30, Professor L. de Launay discusses in some detail the structure of the Carpathians, with special reference to their relation to the operations of war in the eastern area.

Fundamentally the Carpathians form, of course, the upper segment of that great curve, like an inverted S, which crosses the Danube to be continued into the Balkans. Thus one naturally thinks of them as a massive wall, stretching from Pressburg to the Iron Gates of the Danube. But this conception of a wall, as Professor de Launay points out, is really only applicable to the middle segment, the Eastern Beskid Mountains of the map, for both to the east and the west of this region the range is flanked by two huge bastions, built up of numerous interlacing crests. The western bastion is made by the Tatra Mountains, the eastern by the complicated masses of the Transylvanian Alps. The necessary consequence has been that when the Russians have advanced to the barrier it has been against the central section, from the now familiar Dukla in the north-west to Narworna in the south-east, that their efforts have been directed. The relation of the geology of the region to the line of advance of the Russians last spring is interesting. A large part of Galicia is a great plain where underlying primary rocks are covered by glacial deposits. This plain abuts upon the widely distributed beds called Flysch, which form the greater part of the folds of the Carpathians. These beds are composed of soft sedimentary rocks, which crumble to form smooth slopes, giving a soil which permits of the copious growth of trees. Thus we have the characteristic wooded slopes of the central Carpathians. The junction between the debris-covered plain and the Flysch slopes to the north is marked by a girdle of towns, many of whose names have now become household words. Of these Ostrau, Cracow, Tarnow, Rzeszow, Przemysl, Sambor, Stanislau, Czernowitz, and Radautz are the most important. These are linked by a railway which follows the curve of the mountains. These towns mark, as we have said, the beginning of the Flysch slopes, but just within the area where these rocks occur we come upon the belt of salt-producing and petroleum-yielding beds which have played so important a part in the war. Beyond this belt of economic importance another series of Flysch rocks brings us to the crest of the chain, where a number of depressions permit the construction of transverse lines putting Hungary into communication with Galicia. To the inner or Hungarian side of the great

curve, however, the sedimentary beds are replaced by volcanic rocks, whose presence is associated with copious faulting. Further, since the chain has the usual dissymmetry of folded mountains, we find that while the Flysch slopes on the northern side are easy, the southern side of the chain presents a steep front to the Hungarian plain. It is in the volcanic belt that the famous mines of Hungary occur, where gold and silver are associated with copper, iron, lead, and zinc. The volcanic zone engirdles the vast plain of Hungary with its great masses of alluvial deposits. To the north of the area of metalliferous rocks there appears a tract of great geological importance, whose characters have not, however, as yet exerted any influence on the progress of the campaign. The great peculiarity here is the appearance along a band some three miles in width, stretching from the north of Vienna through Neumarkt and Lubotin, of picturesque isolated rocks, standing up in the middle of beds of quite different character, and composed of a compact limestone which is quarried. These rock masses are of course *Klippen*, similar to those so clearly described and figured by Professor Geikie in his article here (vol. xxvii. p. 408) in the case of the Swiss Alps.

One other point in regard to the relations of the Carpathians may be mentioned because of its bearing upon the operations of war. Their northern extremity, as we have said, swings round to Pressburg. But they are separated from the old massif of Bohemia and from the Sudetes by the gap of the Oder, which makes easy communication possible between Vienna and Cracow and Cracow and Breslau. The great fortress of Cracow guards this gap (cf. p. 490 above).

The Origin of the Vat, Deeside.—Dr. Alexander Bremner discusses in the July issue of the *Cairngorm Club Journal* the origin of the remarkable gigantic pot-hole, found near Cambus o' May, on Deeside, and known as the Vat. This curious structure has an almost perfectly circular floor, 59 feet in diameter, and is bounded by smooth walls which curve upward and inward, and in shape are parts of an almost perfect sphere. The cavity is excavated in granite, and lies on the course of a gorge out of all proportion to the small Burn o' Vat which now occupies it. The gorge further is continued beyond the point where the present stream enters it, its upper end forming a notch, or wind-gap, on the col between Culblean and Cnoc Dubh. Dr. Bremner goes on to show that both the gorge and Vat originated through the action of an overflow stream from the Dee Valley glacier, at the time when this ended against the face of the Cnoc Dubh ridge. This meltwater, which poured over the col between Culblean and Cnoc Dubh, found along its course a line of weakness due to a narrow belt of close-jointed granite, and excavated a gorge in this. The Vat is the remains of a huge pot-hole on the course of this channel, the water entering the weak belt in such a way as to produce a strong eddy here. The preservation of this great pot-hole is the result of the fact that further recession of the glacier cut off the powerful stream of meltwater before it had time to destroy its own previous work.

"White Coal" and "Grey Coal" in European Russia.—An anonymous article in the *Revue Générale des Sciences* for June 30 discusses Russia's resources in water-power ("white coal"), and in peat ("grey coal"), questions of much importance in view of the rise in price of coal and petroleum in that country. There are three areas in Russia in which water-power obviously exists on the grand scale, these being the Caucasus, the Urals, and Finland. But in addition to these regions, which for the most part are remote from the great centres of population, the large rivers are capable of furnishing an enormous supply of energy. A sketch-map shows that this power could, by modern methods, be distributed over the large industrial areas of the south, the north-west, and the south-west. As yet, however, little has been done to utilise the country's resources in water-power. A recent inquiry indicates that at present the whole of the hydraulic installations in the empire have at their disposal only some 250,000 horse-power. Further, some 80 per cent. of the existing installations are small, and large electrical works from which power could be distributed over a wide area are as yet very rare. It is the erection of such works that is the greatest need of the country, and hitherto the technical knowledge and skill necessary for their construction has not been available in Russia.

The central part of European Russia is not well placed in regard to possible developments of hydraulic installations, and it is here especially that the rise in price of fuel in the form of coal and petroleum is leading to an increased interest in the country's vast supplies of peat. It is estimated that some 133,600 square miles of the surface of Russia are covered with peat bogs, which form lands of little use agriculturally. Deposits of peat are very abundant in the vicinity of Moscow and Vladimir, and the factory proprietors here are especially interested in the attempt to utilise the fuel. The great difficulties in the way of peat utilisation are the cost of transport, and the amount of storage room necessary. Both these difficulties are best got over by the conversion of the peat into electrical energy in the area of origin, and the subsequent transmission of the power to the factories. At present such transmission is readily effected for distances up to nearly 100 miles, and if electrically driven machinery were also used for the extraction of the peat, it would diminish greatly the cost of production. An electrical station on a large scale is already in process of construction near the town of Bogorodsk, some 43 miles from Moscow, and is intended to supply energy to many factories situated in the vicinity.

Immediately before the war efforts were being made to further by all possible means the utilisation of the peat deposits in Russia, and though temporarily interrupted by the war, it is hoped that these efforts will be renewed later.

Asia.

The Origin of the Himalayan Foredeep.—In a recent paper Col. Sir Sidney Burrard, Surveyor-General of India, returns to the difficult and disputed question of the origin of the Indo-Gangetic Trough,

usually called the Himalayan Foredeep. His paper appears in the *Proceedings* of the Royal Society (A. vol. 91, 1915), and is illustrated by some interesting sketch-maps.

As is well known, the plains of Northern India consist of alluvial deposits brought down by the rivers Indus and Ganges. These plains conceal from view a deep trough that has been formed in the solid rock of the earth's crust. The trough is bounded on the north by the Himalayas, mountains of Tertiary age, and on the south by peninsular India, formed of an ancient pre-Tertiary tableland. North of the trough the earth's crust has undergone continual compression, disturbance, and uplift since the beginning of Tertiary time. On the other hand, south of the trough it has remained undisturbed since the close of the Palæozoic era. In regard to the origin of this great trough three views have been advanced. According to Professor Suess it is a downward bend of the crust of the earth in front of the advancing Himalayan wave, and thus owes its origin to horizontal compression from the north. According to Mr. Oldham it has been caused by the sinking of the crust under the weight of the alluvial deposits brought down from the mountains by the rivers, and is thus due to vertical subsidence and depression. Finally Colonel Burrard believes that it has been caused by a tension in the crust, and is a crustal opening or rift.

The present paper is chiefly devoted to a consideration of Col. Burrard's view as against that of Mr. Oldham, and the following seem the most interesting points in the argument. Col. Burrard compares the Himalyan Foredeep with the Japanese trough called the Tuscarora deep. (See map and text in Geikie's *Mountains: Their Origin, Growth and Decay.*) This deep has somewhat similar features to the Himalayan one, but is filled with seawater instead of alluvium. It may in course of time become filled with sedimentary deposits, but its existing trough-like form cannot now be attributed to the weight of deposits. If the one feature originated independently of a filling by alluvium, why not the other? Again, Col. Burrard shows that submarine troughs extend seawards, from the deltas of the Ganges and the Indus, while similar troughs are absent off the deltas of the other Indian rivers. These troughs have not yet been filled with alluvial deposits and are antecedent to such deposits; they represent seaward extensions of the foredeep without the filling, suggesting that the deep originated independently of the deposits now found within its central portion.

The paper includes also a discussion of the probable subterranean form of the Foredeep and the bearing of this upon theories as to its origin.

Agriculture in India and the War.—Sir Charles Armstrong last spring delivered a lecture on Indian Trade and the War to the Royal Society of Arts, a lecture reported in full with the discussion in the *Journal* for May 28. Sir Alexander M'Robert, who took part in the discussion, mentioned some interesting points in regard to indigo and wheat in India. As regards indigo he expressed the opinion that the large fortunes made in the days before the manufacture of the synthetic

product led the Indian planters to abandon the cultivation of the plant immediately after the sudden drop of price when artificial indigo was put upon the market. They had been accustomed to prices ranging from 4s. to 8s. per lb., and as the artificial product is sold at 8d. per lb. they regarded any thought of competition as hopeless. Now that German artificial indigo is cut off, fine Behar indigo is selling at 14s. per lb. This of course will not last, but Sir Alexander stated his belief that by improving the strains of the plant, and by increased attention to methods of cultivation and manufacture, it would be possible for the natural product to compete with the artificial even after the war. He thought that one result of the war might be the resuscitation of the indigo industry of India.

In regard to wheat he stated that it was expected that India, under Government auspices, would be able this year to export something like 2,000,000 tons of wheat, on which a profit of £5,000,000 is expected to be made. This profit is not to be regarded as revenue, but is to be earmarked for the benefit of the ryot. He gave 32,000,000 acres as the area under wheat in India, but stated that the average crop was only 11 bushels per acre. It is hoped that by the use of better varieties, by deeper ploughing, and by the use of fertilisers it may be possible to raise very considerably the average yield per acre.

The Salt Lagoon at Larnaka, Cyprus.—Dr. J. H. Pollok read a paper before the Royal Dublin Society in June last, on the salt lagoon situated about one mile from the port of Larnaka, in the south of the island of Cyprus. The lagoon is about three square miles in extent, and fills up with seawater during the winter, by infiltration or otherwise. During the hot summer months the water largely dries up, leaving a deposit of excellent salt from which the government derives a considerable revenue. At the time of greatest concentration, about the end of August, there is a pool of mother liquor in the centre of the lagoon having a width of 1800 feet, a length of about 3600 feet, and an average depth of about 3 inches, giving an aggregate of about 40,000 tons of liquor. This consists of an almost saturated solution of magnesium chloride, together with a small proportion of magnesium bromide. Bromine is estimated to occur to the extent of about 10 lb. weight per ton. The interest of the investigation lies in the fact that there is at the present time a considerable shortage of bromides and even of magnesium salts, owing to the fact that supplies have hitherto come from Stassfurt, and are now cut off on account of the war. The new supply from Cyprus should go a long way towards diminishing the shortage.

America.

The Flora of the United States.—A series of colour plates illustrating the wild flowers of North America, with accompanying letterpress, is in course of publication in the *National Geographic Magazine*, the first article of the series appearing in the May issue. The plates are very good, and the series, when completed, should give a clear idea of

the contrast between the common wild flowers of temperate North America and those found here. In the letterpress the common and scientific names and the distribution are given, but no attempt is made to classify the plants, nor to indicate the general characters of the North American flora. The most interesting plant among those figured in the May issue is the Trailing Arbutus or Mayflower, the harbinger of spring in the colder parts of the States. This is a moorland plant, intolerant of garden soil, and of soil containing lime. It has been losing its hold steadily with the spread of cultivation in America, and this apparently less on account of the generally supposed reason—that its sentimental associations cause it to be rooted up near towns and settlements—than because, like heather, the soil in which man's cultivated plants thrive is fatal to the mycorhizal fungi which normally live upon its roots, and enable it to exist in the most acid of soils.

NEW BOOKS.

EUROPE.

The Partitions of Poland. By Lord Eversley. London: T. Fisher Unwin, Ltd. *Price 7s. 6d. net.*

With the present war the position and prospects of Poland have assumed a new importance in politics, and this work from the pen of the veteran Lord Eversley appears at an opportune moment to remind us of the processes by which the partitions came about, and of the shares which were taken in the spoliation by Russia, Prussia and Austria respectively. The conditions existing in Poland prior to 1772, when the first partition took place, were those of anarchy, and that the shadow of coming events was apparent a full century earlier is shown in a satirical speech addressed to the Diet by Casimir, king of Poland, on resigning the throne in 1667. Lord Eversley quotes from the version of the speech given by Carlyle in his *Frederick*:—

"The day will arrive, and the day is perhaps not far off, when this glorious republic will get torn into shreds hither thither; be stuffed into the pockets of covetous neighbours—Brandenburg, Muscovy, Austria—and find itself reduced to zero, and abolished from the face of the world."

The anarchy in Poland, brought about by its unworkable constitution, with its *Liberum Veto*, by which one adverse vote sufficed to paralyse the action of the Diet, invited aggression from covetous neighbours, and Russia, Prussia and Austria were ready to take advantage and hungry for territorial expansion. Catherine II. had as instigator and accomplice Frederick the Great, and the first partition, that of 1772, was mainly effected by bribery. Lord Eversley does not agree with Carlyle in the latter's defence of Frederick; on the contrary, he holds that Frederick was responsible for the initiation of the scheme.

It is perhaps needless to say here that there were three partitions of Poland, viz., those of 1772, 1793, and 1795, before the ancient kingdom disappeared from the map of Europe. Lord Eversley deals with each of these stages, separately and in detail, surveying the conditions which led up to them. It is a record of treachery and rapacity in which he has no hesitation in awarding the palm to Prussia. This is his scathing judgment:—

"Whatever excuses may be alleged on behalf of Frederick, no plea can possibly be urged on behalf of his successor, Frederick William, in abatement of his perfidies. In drawing Poland away from alliance with Russia, entering into a treaty—offensive and defensive—with her, promising support to her new constitution, and then, when the ink of his treaty was hardly dry, turning round and throwing over all his treaty obligations, and agreeing with Russia to dismember Poland, his course was perfidious and disgraceful to a degree almost incredible."

Contemporary dispatches from Lord Grenville to Eden, our minister at Berlin, show how strongly the British Government disapproved of the action of the three Continental Powers, but, under pressure of war with France, Pitt modified his attitude, and Lord Eversley thinks it difficult to acquit him of tacit connivance in the rapacious schemes of aggrandisement of Russia, Prussia and Austria at the expense of unhappy Poland.

On the period from 1793 to 1795, when the tremendous drama of the French Revolution was unfolding itself, events in Poland had an important bearing. Lord Eversley shows, in a very interesting and suggestive chapter, how Poland was the saving of France, for the dissensions of the three Powers, and their greed for territory, diverted them from their main purpose of hostility to the Revolution and of restoring the Bourbons.

The latter portion of Lord Eversley's book deals with Napoleon and the Duchy of Warsaw, the repartition of Poland by the Congress of Vienna in 1815, and the course of events down to the present time. While Germany has persisted in a policy of repression with her Polish subjects, Austria, by granting a measure of home rule in Galicia since 1866, has succeeded in winning their loyalty. In this respect, Germany has been the least successful of the three Great Powers concerned. They have all made bids for the support of the Poles during the present war. "One of the main issues is whether these promises are to be fulfilled by Russia alone, or by Austria and Prussia combined."

No one can rise from the perusal of Lord Eversley's book without feeling grateful to him for the clear and admirable presentation he has made of his subject. We are sure that the book will be widely read.

Russia and Democracy: The German Canker in Russia. By G. DE WESSELITSKY. London: Wm. Heinemann, 1915. *Price* 1*s. net.*

While Peter the Great contemplated an alliance between Russia, France and Britain, he never imagined that Germans would obtain a predominant position in his Empire. Yet this actually occurred. Intermarriage with members of German dynasties gave a German character to the Russian court. German nobles and adventurers followed, then German *savants* and teachers, until the Russian Academy of Sciences became a German institution and published its works till quite lately in German. Even chemists' stores in St. Petersburg were an exclusive privilege of Germans. The court, diplomacy, army, and the higher administration became a private German domain, and the German yoke proved to be harder and more harmful than the ancient Mongol. Even the Tsar grovelled before Germany, as when Peter III. in 1762 gave back to Frederick the Great East Prussia, Brandenburg and Pomerania which had been conquered by the Russian army then occupying Berlin. A predilection for Germans marked the whole policy of Alexander I., who saved Prussia when Napoleon wished to wipe her off the map. Nicholas I. also was thoroughly German in his ideas, and his foreign

minister, Count Nesselrode, a German by birth, could not even speak Russian. It is not surprising that British trade with Russia passed into Germany's hands or that a deep estrangement was created between Russia on the one hand, and Britain, France and Austria on the other. Although Alexander II. was a great reformer, his foreign policy was guided by German sympathies, and controlled by Bismarck. Alexander III. discovered the deceit of Bismarck and concluded an alliance with France. He refused to give preference to Germans over Russians in the military and civil services, and he made the Russian language obligatory in diplomatic correspondence in Russia. His son, the present Tsar, Nicholas II. faithfully maintained the French alliance, and established the Triple *Entente* of Russia, France and Britain. The volume is written by one who has thoroughly mastered his subject, and who longs for the liberation of all Slavs, Russian included, from the German yoke. It is interesting to recall that Field-Marshal Moltke, in conversation with Mr. Sidney Whitman in 1889, said that he thought it "only natural that the Russians should be jealous of the German element" and that they should "desire to emancipate themselves from foreign influences and to look after their own affairs."

The Two Maps of Europe and some other Aspects of the Great War. By HILAIRE BELLOC. London: C. Arthur Pearson, 1915. *Price* 1*s. net.*

This little book is, we gather, a reprint of articles by the author which appeared during the past winter. It contains six short essays, the first being that which gives its title to the book. In this, which is illustrated by sketch-maps, Mr. Belloc considers the difficult question as to what constitutes a nationality. He places, rightly we think, a corporate tradition as the most important element, especially when enshrined in history. To this he adds a common language and religion, but it is perhaps characteristic that he says nothing of a community of economic interest, which has certainly been a great nation-making factor in the case of Great Britain. After a consideration of the "true national frontiers" of Europe, the author goes on to consider the changes which the Central Powers desire—or are credited with desiring—to produce, as contrasted with those which he believes to be in the mind of the Allies. We confess to feeling that it is somewhat too soon to draw up a detailed map of "Europe remodelled by the Allies," but are interested to note that the map includes "an independent Catholic Southern Slav or Croat State, probably a holding of Vienna," which is apparently to include the peninsula of Istria with both Fiume and Trieste. The essay, we must presume, was written before the Italian intervention. The remaining essays in the book discuss various points connected with the war in the style to which Mr. Belloc's readers are now accustomed.

ASIA.

A History of Persia. By Lieut.-Col. P. M. SYKES, C.M.G., C.I.E., Indian Army, Gold Medallist of the Royal Geographical Society, author of *Ten Thousand Miles in Persia*, and *The Glory of the Shia World*. With Maps and Illustrations. In Two Volumes. London: Macmillan and Co., Ltd., 1915. *Price* 50*s. net.*

While this work as a whole is outwith the scope of this *Magazine*, we cannot refrain from offering most hearty congratulations to the author upon the completion

of a task which will enhance his fame not only throughout the English-speaking world but in Persia itself. Colonel Sykes could have given no better proof of his love for the land of Iran than this magnificent account of its past glories. Much new light, notably that from the deciphering of the cuneiform inscriptions, has been shed upon Persian history since Sir John Malcolm produced a work which has been a standard for a century. Excavations have also been carried out with enthusiasm by numerous investigators. The result is an immense amount of fresh material, and this, as well as the old, has been dealt with by the author with masterly skill. The book, however, is not for the expert alone, but the general reader, who has a liking for history, and especially if he is fond of turning occasionally to the pages of Gibbon, will derive from it much pleasure and instruction. Colonel Sykes is well aware that geography is the foundation of history, and the first three chapters are devoted to a condensed but comprehensive description of the geography of Iran and Babylonia. The geographical basis of the relations between Persia and Hellas is also well brought out, and every now and then, indeed, we meet with a paragraph which is interesting and illuminating to the geographer. The maps are most useful and adequate and the illustrations numerous and well-produced. Some of the latter are by Persian artists, others are taken from the works of previous travellers—some of these being most quaint and distinctive—and many are from photographs by the author. The student of Asiatic politics will doubtless be gratified to find that the history is brought down to 1906, when the bloodless revolution took place which destroyed absolutism and brought in a new constitutional era. The author, however, wisely eschews prophecy, and contents himself with remarking that the future of Persia lies on the lap of the gods.

AFRICA.

Adventures in Africa, under the British, Belgian, and Portuguese Flags. By J. B. Thornhill, author of *British Columbia in the Making.* With Map, Diagrams, Index and Glossary. London: John Murray, 1915. *Price* 10*s.* 6*d. net.*

This is a racy and entertaining account of life and work in the Katanga tin and copper belt. The author, who may be described as one of the band of engineer adventurers scattered all over the world where work is to be found and sometimes where it isn't, was for some time employed by the Tanganyika Concessions Company in the Belgian Congo. His first chief was George Grey, brother of the Foreign Minister, for whom Mr. Thornhill had the highest admiration. Naturally one expects to find in the book some reference to the famous "atrocities." The author's opinion is first that these were greatly exaggerated, and that what did occur were due to the incapacity and unsuitability of many of the Belgian officials—ex-bus conductors, office-boys, and failures in every class of life, he calls them—and to the system of handing over parts of the country to be exploited by monopolist companies. Amongst much that is of geographical interest is the author's view that the prime factor in the development of Africa, south of the Equator, is the watershed. It is higher than the general level of the country and is thus suitable for European settlement, but, what is perhaps of greater importance, it provides the best, and often the only route, for roads and railways. Thus he considers that the Congo-Zambesi watershed will be followed by a trunk railway from the coast, and on both sides of it is land well adapted for cattle-raising on a large scale, with an assured market in the mine-workers and concessionaires of the mineral belt.

AMERICA.

Central and South America. By WILLIAM R. SHEPHERD. London: Williams and Norgate. *Price* 1*s. net, in cloth.*

The above forms part of the Home University Library, and particularly of the section of it which deals with History and Geography. To compress a survey of the enormous stretches of territory comprised in the twenty republics that go to make up Latin America into a small volume of some 250 pages is no slight undertaking. But the author, who is Professor of History in Columbia University, New York, displays a thorough grasp of his materials, while a clear and vigorous style enable him to invest his subject with a degree of vivid interest which is sometimes lacking in text-books of the kind. Beginning with the expansion of Spain and Portugal to the American continents during the fifteenth and sixteenth centuries, Mr. Shepherd traces the growth of the colonies and their gradual evolution into the republics of to-day. He points out that the Spanish Empire in America was at its widest in 1786, when it extended northward to what is now the State of Missouri, and southward to Chile. To Portugal, of course, belongs the acquisition of Brazil, which alone occupies an area more than half the size of the continent of South America. The possibilities of an outlet in Brazil for the surplus population of the old world, if the forests were cleared away, and the vast fertile basin of the Amazon rendered fit for settlement, furnish an attractive subject for speculation; but the obstacles are tremendous, and this must, at the best, be a slow and gradual process.

Statistics which exist of the present-day population of most of the countries of Latin America are quite unreliable, Professor Shepherd says, on account of the difficulties of taking a census, though this does not apply to the Argentine and Chile. The British are chiefly to be found in the southern republics, and the following is worth quoting as the testimony of a friendly American. Professor Shepherd says, "The use of the English language is making rapid headway everywhere in Latin America; and the growth of English influence is more or less commensurate with it. The 'word of an Englishman' (palabra de Inglés) is proverbial; bonds and other financial securities are jocularly referred to as 'Ingleses' (*i.e.* Englishmen); and all the native of Albion needs, in order to be identified, is to 'wear a sandy moustache and have a W in his name.' In these distinctions, also, the American is coming to have a share."

Professor Shepherd speaks in high terms of praise of the characteristics of the dominant, *i.e.* mainly the large land-owning classes amongst the Latin Americans. "Affable, kindly, and courteous, they are alike hospitable, generous, and forbearing, warm in their friendships and no less bitter in their enmities. High-spirited, quick-minded, sensitive to a degree, they expect that the qualities they themselves display will be reflected by people with whom they are brought into contact. Brave and courageous, also, they are patriotic to the heart's core."

One cannot but have a feeling of sentimental regret for the disappearance of the picturesque figure of the cowboy, due to the spread of agriculture and the use of barbed wire for dividing the cattle-runs.

There is much more that is suggestive and interesting in Professor Shepherd's admirable little book, but we trust we have said enough to draw attention to its merits.

Brazil (1913). By J. C. OAKENGULL. Printed by Butler and Tanner, Frome, England. *Price* 7*s.* 6*d. net.*

This is a compilation, published annually, dealing with the physical geography,

climate, people and products of Brazil, and is distributed by the Brazilian Government. It contains a large amount of information about the country, and is illustrated by an economic map, two town plans, and numerous reproductions from photographs.

AUSTRALASIA.

The Log-Books of the "Lady Nelson," with the Journal of her first Commander, Lieutenant James Grant, R.N. By Ida Lee, F.R.G.S. (Mrs. Charles Bruce Marriott), author of *The Coming of the British to Australia*, etc. With 16 Charts and Illustrations from the Originals in the Admiralty Library. London: Grafton and Co., 1915. *Price* 10*s.* 6*d. net.*

The history of Australian exploration is one of intense, and, occasionally, of painful interest. From the days of the early Portuguese navigators, who generally concealed their discoveries at least from the world at large, down to the times of Forrest and Gregory, it has been a tale of great work accomplished under great difficulties. Among all these tales there can be few more absorbing than that of the *Lady Nelson*. She was a brig of sixty tons, a mere midget of a ship, and yet is worthy of a place among the great vessels of discovery. She was the first ship to sail parallel to the south coast of Australia along its entire length, and to traverse Bass Strait; her boats explored the spacious harbour of Port Philip, on which Melbourne now stands; she paid frequent visits to Tasmania and Norfolk Islands; assisted in the mapping of the Queensland coast, and in forming a settlement at Port Essington in the north. Finally, she was captured by pirates off Timor Laut when on a voyage in search of supplies for the new northern settlement. Mrs. Marriott tells the story largely by means of extracts from the ship's log, supplemented by a running commentary, and by a few chapters compiled from other sources where log-books have been lost. She has a hereditary interest in Australian exploration, and shows her enthusiasm by the completeness and minuteness of her narrative. The reproductions of charts are helpful and interesting. Altogether the book has permanent value as an original source to all students of Australian history.

GENERAL.

The Statesman's Year-Book: Statistical and Historical Annual of the States of the World for the Year 1915. Edited by J. Scott Keltie, LL.D., assisted by M. Epstein, M.A., Ph.D. London: Macmillan and Co., 1915. *Price* 10*s.* 6*d. net.*

In spite of the obvious difficulties this invaluable annual appeared at the usual time, and the articles for the most part preserve a serene detachment from the great conflagration. Thus in the account of Belgium we come with a sudden shock of surprise upon a list of the chief towns, including Louvain, Namur, Mons, Charleroi—names which strike upon the ear like a knell, together with statistics in regard to the ill-fated University of Louvain. Generally, indeed, the volume dates from that far-off period "before the war." Special articles and notes, however, summarise all the main facts in regard to the conflict. We observe that in the table of dates May 23 is given as the day of declaration of war between Germany and Italy. This is certainly not the usually accepted view. A very useful item in the present issue is a list of official and non-official publications on the war, classified according to the country of origin. On the whole, one feels that the editor's attitude is full of quiet confidence, of a conviction that the

disturbed balance can be readjusted, that new students will flock to the ruined Belgian universities, new children be born to replace those foully murdered, that life will once again flow in the accustomed channels, that the days when truth, honour and decency counted for more than Teutonic *kultur* will return. We must all hope that his confidence will be justified.

All the four maps bear upon problems connected with the war.

The Year-Book of Wireless Telegraphy and Telephony, 1915. London: The Wireless Press, 1915. *Price 3s. 6d. net.*

This is the third issue of this useful annual, the volume being somewhat larger than the 1914 edition. Owing to present conditions, the promised article by Mr. G. E. Turnbull on "Wireless Telegraphy in the Merchant Service" has been omitted, but there are some interesting general articles. Among these may be mentioned one by Mr. Archibald Hurd on "Wireless and War at Sea," and a striking historical paper, entitled "The Influence of Wireless Telegraphy on Modern Strategy," by Colonel Maude, in which the Napoleonic strategy is once again discussed. Of more direct geographical importance is Mr. R. G. K. Lempfert's "The Application of Wireless Telegraphy to Meteorology." In this paper the author discusses the collection of meteorological information by wireless from ships at sea, and also the possibility of utilising wireless as a means of distributing information in regard to the weather more quickly than by post, and at a cheaper rate than by the ordinary telegraph. There are several other sections which appeal to the general public as well as to the expert.

La Guerra Mondiale. Del Professor Giuseppe Ricchieri, Biblioteca della Università Populare Milanese, &c. Milano: Presso la Federazione Italiana delle Bibl. Populari. *Prezzo L.*1.50.

This little manual derives its importance not only from the fact that it is an earnest endeavour to put before the people of Italy the various influences which have been working throughout Europe, rendering war inevitable, but also from its having been written before Italy had entered into the arena. The scope of the work is to lay before the Italian public a statement of these influences, and to indicate what, in the author's opinion, are the standpoint and interests of Italy. The position in which that country found itself when war broke out may be put in this way. The statistics of emigration had been increasing rapidly, and she had no colonies worth speaking of to divert this stream from abroad. Her manufactures are, it is true, increasing, but the imports largely exceed the exports, and the balance has only been kept straight by two causes, her foreign tourist traffic and the savings sent home by her emigrants. No one can tell how the war will affect these two items, but in both cases much depends on the friendship of other nations to Italy and her people, and in any case she has not felt that she can sit down and let her destinies be fought out over her. One of the most urgent questions is the increasing rate of emigration, and as Italy cannot contemplate acquiring new colonies, her energies must be devoted to securing the best terms for her sons who go to other lands. There are three things which she desires: the Trentino and Istria, also the power to insist that Italians who settle in other lands shall be treated on favourable terms, Tunis being held up as an instance where there are vexatious restrictions to Italian immigration, affecting the encouragement of her language and schools. The author did not think she would gain by keeping neutral. Neutrality "non dà un amico e non toglie un nemico" (does

not gain friends nor avert enmities), as Mazzini put it, not to mention Machiavelli and Livy of old.

EDUCATIONAL.

Educative Geography: A Note-book for Teachers. By JOHN L. HADDON, B.Sc. (Lond.). London: G. W. Bacon and Co. *Price* 1*s. net.*

The title adopted for this book may at first sight arouse some prejudice, but this will at once disappear when its contents are studied. It seems to us quite an admirable treatment of simple, practical geography for schools, written by an experienced teacher, who has himself carried out with his classes the courses of work recommended. Many of these strike us as very fresh and interesting. We may note especially the charts used to indicate the variation in the length of the day throughout the year, related to the hours spent in school, and the suggestions as to how these charts may be used to explain the conditions at the equator and near the poles. Another happy suggestion is that the children should be allowed to trace on large sheets of paper parts of, *e.g.*, the English coastline, and then gum at the side of the sheet picture postcards illustrating the scenery of particular parts of the coast, such as the Yorkshire cliffs and the sandy beaches further south. We note that the author divides holiday haunts into the two classes of pleasure towns and wild lands. The distinction is good, but we should prefer uncultivated or some similar expression for "wild," which is not always appropriate. We recommend the booklet cordially to the notice of teachers, who will find it very helpful.

The Atlas Geographies: Junior Geography—The British Empire beyond the Seas. By THOS. FRANKLIN, A.C.P., A.R.S.G.S., E. D. GRIFFITHS, B.Sc., F.R.G.S., F.C.S., and E. A. SHEARMUR, B.Sc. Edinburgh and London: W. and A. K. Johnston, Ltd., 1915. *Price* 7*d.*

This new volume preserves the features and standard of preceding issues; these have already been favourably reviewed. We need merely call attention to the present work, which deals with India and our other eastern possessions, and our colonies and dependencies in Australasia, Africa, and America.

The Surface of the Earth. By HERBERT PICKLES, B.A., B.Sc. Cambridge: The University Press, 1915. *Price* 2*s.*

The object of this work is "to provide a readable account of the earth's surface and the changes that are taking place upon it, and to show how human activities are controlled by physical and climatic conditions." We wish to say that the author has attained his object, for the book is eminently readable. Those who desire an account, within a reasonable compass and at a reasonable cost, of the state of present-day geography, will do well to secure this little volume. The photographic illustrations need special praise—they are fresh, plentiful, and helpful.

Junior Regional Geography: The Three Southern Continents. By J. B. REYNOLDS, B.A. London: A. and C. Black, 1915. *Price* 1*s.* 4*d. each.*

There is nothing very striking from a strictly geographical point of view about this small work. It follows almost entirely the narrative method, though the "Summaries, Questions, and Suggestions" may, as the Preface hopes, "stimulate fresh lines of thought." The account is readable, and the name and reputation of the firm of Black are enough to guarantee the neatness of the format.

THE SCOTTISH GEOGRAPHICAL MAGAZINE.

THE IMPORTANCE OF GEOGRAPHICAL RESEARCH.[1]

By Major H. G. Lyons, D.Sc., F.R.S.

This year, when the British Association is holding its meeting in times of the utmost gravity, the changed conditions which have been brought about by this War must occupy the attention of all the Sections to a greater or less extent, and our attention is being called to many fields in which our activities have been less marked or more restricted than they might have been, and where more serious study is to be desired. The same introspection may be usefully exercised in geography, for although that branch of knowledge has undoubtedly advanced in a remarkable degree during the last few decades, we have certainly allowed some parts of the subject to receive inadequate attention as compared with others, and the necessity for more serious study of many of its problems is abundantly evident.

Nor is the present occasion ill adapted to such an examination of our position, for when the British Association last met in this city, now twenty-eight years ago, the President of this Section, General Sir Charles Warren, urged in his address the importance of a full recognition of geography in education on the grounds that a thorough knowledge of it is required in every branch of life, and is nowhere more important than in diplomacy, politics, and administration.

Matters have certainly advanced greatly since that time, and a much fuller appreciation of geography now exists than that which formerly prevailed. At the time of the address to which I have referred the serious study of geography in this country was on the eve of important developments. The Council of the Royal Geographical Society had for some time been urging the importance of geography being studied at

[1] Presidential Address to Section E (Geography) at the Manchester Meeting of the British Association, 1915.

the Universities so that there should be an opportunity for advanced students to qualify themselves as scientific geographers by study and original research in the subject. The time had arrived for this ideal to become an accomplished fact, and in the following year, 1888, a Reader in Geography was appointed at Oxford University, and a Lectureship in the same subject was established at Cambridge. Since then the advance has been steady and continuous not only in the increased attention given to the subject, but also in the way in which it is treated. The earlier bald and unattractive statistical presentation of the subject has now been almost everywhere replaced by a more intelligent treatment of it, in which the influences of the various environments upon the life which inhabits a region are appreciated, and the responses to such influences are followed up. Instruction in the subject is given by those who have seriously studied it, who realise its importance, and who are in a position to train up new scientific workers in the field of geography. Though much remains to be done there should be now a steady output of geographical investigators capable of providing an ever-increasing supply of carefully observed data, which they will have classified methodically and discussed critically, in order that these may be utilised to form sound generalisations as to their relationships and sequence in accordance with the method which is employed in all scientific work.

In order that we may see what advance has been made in the scientific study of geography in this country during the last quarter of a century, we must turn to the results that have been attained by the activity of geographical investigators who have devoted themselves to the serious study of various phenomena, and the detailed investigation of particular regions. If we do so I think that we must admit that the number of original investigators in scientific geography who are extending its scope in this way is not so large as it might be, nor are we yet utilising sufficiently all the material which is available to us. Any one who will examine the geographical material which has been published in any period which he may select for review will find that purely descriptive treatment still far outweighs the analytical treatment which alone can lead to definite advances in scientific geography. If pleasing descriptions of this or that locality are sought for, they are for the most part to be found readily in the very large amount of such material that has been and is being published each year by residents, travellers, and explorers ; but if information is desired in the prosecution of a piece of geographical research, we are checked by the lack of precise details. Few of this class of descriptions are sufficiently definite to enable the necessary comparisons to be made between one locality and others which are similarly situated ; thoroughly quantitative treatment is for the most part lacking, and while a pleasing picture is drawn which is probably true in character, it is usually inadequately furnished with those definite facts which the geographer requires.

I propose, therefore, to examine a little more closely the question of geographical investigation and research in order to see where we stand and in what direction it behoves us to put forth our energies to the end that a branch of knowledge which is of such importance shall rest upon

that basis of detailed study and investigation which alone can supply the starting-point for further advance. The intricate and complicated character of the subject, the extent of its purview, the numerous points at which it touches and imperceptibly passes into other well-defined branches of knowledge, render the study of geography very liable to degenerate into a purely descriptive treatment of the earth's surface and all that is to be found thereon, rather than to follow the narrow path of scientific progress in which the careful collection of data furnishes the material for systematic discussion and study in order that trustworthy generalisations may be reached.

The opportunity to undertake long journeys through distant lands comes to few of us, but this is not the only direction in which research can be profitably undertaken, for there is no part of these islands where a geographer cannot find within his reach some geographical problem which is well worth working out, and which, if well and thoroughly done, will be a valuable contribution to his science. Even for such as cannot undertake such field work the library will provide a host of subjects which have not received nearly the amount of attention and of careful study that they deserve. The one thing essential is that the study should be as thorough as possible, so that all the contributory lines of evidence shall be brought together and compared, and so that the result may prove to be a real addition to geographical science on which other workers may in their turn build.

For those who desire to undertake such investigations there is at any rate no lack of geographical material, for travellers, explorers, and others engaged in various occupations in every part of the world are continually recording their experiences and describing their surroundings in books and pamphlets; they recount their experiences to the Geographical Societies, who apparently have no difficulty in obtaining communications of wide interest for their meetings. Most portions of the British Empire as well as regions belonging to other nations are in these days more or less fully examined, surveyed, and investigated with a view to their development, and those who undertake such work have ample opportunities for the most part for preparing descriptions of the lands in which they have sojourned and with which they are well acquainted. But although the material is so ample the quality of it is not generally such as makes it suitable for an adequate study of the phenomena or the region to which it relates. The ease with which a tract of country or a route can be described by the traveller, and the attractiveness of such a description of a little-known region, results in the provision of a vast quantity of geographical information, the greater part of which has probably been collected by those who have no adequate training in the subject. In such cases it is not uncommon for the writer to disclaim any geological or botanical knowledge, for instance, but the great majority of those to whom the opportunity is given to travel and see new lands and peoples are fully convinced of their competence to describe accurately and sufficiently the geography of the regions which they traverse. But any one who has had occasion to make use of such material in a serious investigation is only too well

aware how little precise and definite information he will be able to extract from the greater part of this wealth of material, and in most cases this is due to the traveller's lack of geographical knowledge. He probably does not know the phenomena which should be observed in the type of region which he is traversing, nor can he read the geographical evidence which lies patent to a trained observer at every point of the journey; much, therefore, of what he records may be of interest, but probably lacks data which are essential to the geographer if he is to understand the geographical character of the region, and utilise it properly.

Thus it happens that although the amount of geographical material which is being garnered may be large, the proportion of it which is available for use in a scientific investigation of an area is smaller than is probably realised by those who have not made the experiment. And yet it is only by this scientific investigation of selected localities or of a single phenomenon, and by working them out as thoroughly as possible, that any real advance in geographical science can be made. The accounts of such pieces of work will not appeal to those who desire picturesque descriptions of little-known lands, but they will be welcomed by geographers who can appreciate the value of such studies. There should now be an ever-increasing number of such geographers, trained to proceed in their investigations by the true scientific method, and there should be a very considerable amount of sound work in various branches of the subject which aims at thoroughly investigating some phenomenon, or group of phenomena, so as to present a grouping of data, carefully verified and critically discussed, in order to arrive at conclusions which may form a useful addition, however small, to the sum of our geographical knowledge.

So far as I am able to judge, the output of serious work of this character is not nearly as large as it should be, and I would indicate some fields in which there is a lack of individual work of this character. Until more of it is undertaken we shall lack in this country the material from which the foundations of scientific geography can be built up, and while our own islands and the various parts of the British Empire furnish unrivalled opportunities for such work, there are still far too many subjects where the most thorough investigations have been made in other countries.

Mathematical Geography presents a field for research which has had comparatively little attention paid to it in this country. In many respects this part of the subject is peculiarly suitable for such treatment, since it admits of the employment of precise methods to an extent which is not always practicable in cases where so many of the factors can only be approximately defined. The determination of positions on the earth's surface is carried to great refinement in the national surveys of most civilised countries in order to furnish the necessary controls for the preparation of large-scale maps, but when we pass to the location of travellers' routes, where considerable allowance has to be made for the conditions under which the observations have to be taken, we find that very inadequate attention is usually paid to the discussion of the results.

Usually a mean value for each latitude, longitude, or azimuth is obtained by the computer, and he remains satisfied with this, so that when the route of another traveller follows the same line or crosses it at one or more points, it is almost impossible for the cartographer to say which of the two determinations of any position is entitled to the greater confidence. In this class of work, whether the results are obtained from absolute observations at certain points or from the direction of march, and the distance traversed, it is quite practicable to determine the range of uncertainty within which the positions of different points are laid down, and it is eminently desirable that this should always be done in order that the adjustment of various routes which may intersect in partially known regions may be adjusted in accordance with definite mathematical processes. Some important expeditions on which infinite labour and considerable sums have been expended have presented their results, in so far as they relate to the routes which have been followed and the position of points which have been determined, in such a way that it is impossible to say within what precision such positions have been determined, and consequently any combination of these results with those of later expeditions has to be carried out empirically, since adequate data are no longer available for the employment of better and more scientific methods.

This crude and unsatisfactory way of treating observations, which in many cases have been obtained under conditions of the greatest difficulty and even hardship, is largely due to the lack of interest which geographers have shown in this part of their subject. Methods of observation and methods of computation are rarely discussed before any of our Geographical Societies or in any of our publications, and it is only by such discussions that the importance of properly working out the available material at a time when the observer can be consulted on points which are doubtful, or where further explanation is desirable, becomes generally appreciated.

No set of physical or astronomical observations is ever discussed or even presented without the degree of precision or reliability being definitely stated: yet in geography this sound rule is too often neglected.

There are several regions where travellers' routes intersect which should provide ample material for the careful reduction and adjustment of the results. I fear, however, that there would be great difficulty in obtaining the original observations which are indispensable in such an investigation, and in the interest of research it is highly desirable that the original documents of all work of importance should be preserved and the place where they may be consulted recorded in the published account.

There is room in the geographical investigation of sea and land, even within the limits of the British Empire, for the employment of methods of observation and computation of the highest precision as well as of the simpler and more approximate kinds, but every one who presents the results of his work should deem it his first duty to state explicitly the methods which he employed, and the accuracy to which he attained, in

such a form that all who make use of them can judge for themselves of the degree of their reliability.

In such work, while the instruments used are of great importance, too often the briefest description, such as "a 4-inch theodolite," is deemed sufficient. If the observer wishes his work to be treated seriously as a definite contribution to science we require to know more than this, and a clear account of the essentials of the instrument, a statement of its errors and of the methods of observation adopted are the least that will suffice. The account of any expedition should treat so fully of the instruments, observations, and computations utilised to determine the positions of places visited that any one can re-examine the evidence and form his opinion on the value of the results obtained. A mere tabular statement of accepted values, which frequently is all that is provided, is of small value from a scientific point of view. Probably one reason for this state of things is that too little attention is being paid by geographers to their instruments. Theodolites, levels, compasses, clinometers, tacheometers, plane-tables, pantographs, co-ordinatographs, planimeters, and the many other instruments which are used by the surveyor, the cartographer, the computer, have in no case arrived at a final state of perfection, but it is seldom that we find a critical description of an instrument in our journals. Descriptions there are from time to time, but these are for the most part weak and insufficient. Not only is a technical description required, which treats fully of both the optical and mechanical details, but we need an extended series of observations with the instrument which have been made under the ordinary conditions of practical work, and these must be mathematically analysed, and the degree of the reliability of the results clearly demonstrated. The description should be equally thorough and complete, including scale drawings showing the construction of the instrument as well as photographs of it. Nothing less than this is of any use to the scientific cartographer.

While I am on the subject of instruments I would draw attention to the importance of the whole history of the development of surveying instruments. In the latter part of the eighteenth century Great Britain provided the best class of surveying instruments to all countries of Europe, at a time when high-class geodetic work was being commenced in several countries; and about this time von Reichenbach spent a part of his time in this country working in the workshops of Dolland and learning this particular class of work. Upon his return to Bavaria he set up at Munich that establishment which soon provided instruments of the highest class for many of the cadastral surveys which were being undertaken in Central Europe. At Munich there is now a fine typical collection of such instruments, but in this country the early advances of British instrument-makers of surveying instruments are far from being adequately represented in our National Museum in a manner commensurate with their importance. The keen and enlightened zeal of geographers who are interested in this branch of the subject would doubtless quickly bring to light much still remaining that is of great interest, but which is yet unrecognised, while a closer attention to instrumental equipment would lead to improvements and advances in

the types that are now employed. There is no modern work in this country on the development of such instruments, and references to their history are conspicuously rare in our journals, so that there is here an opportunity for those whose duties prevent them from undertaking travel or exploration of a more ambitious kind. In the same way, those whose opportunities of field work are few can find a promising field of study in the early methods and practice of surveying which have been discussed by many authors from classical times onwards, and for which a considerable amount of material exists.

In Geodesy and Surveying of high precision there is ample scope for all who are attracted by the mathematical aspect of the subject; the critical discussion of the instruments and methods employed and results obtained, both in this country and in other lands, provides opportunity for much work of real value, while its bearing upon geology, seismology, etc., has not yet been adequately treated here. The detailed history of this part of our subject is to be found in papers which have been published in the technical and scientific journals of other countries for the most part: here too little attention has been given to the subject, in spite of the large amount of geodetic work which has been executed in the British Empire, and which remains to be done in our Colonies and overseas Dominions.

The final expression of the surveyor's detailed measurements is found in the map, and the adequate representation of any land surface on a map-sheet is both a science and an art. Here we require additional work on all sides, for there is hardly any branch of geography which offers so remunerative a field for activity as cartography. We need the co-operation of trained geographers to study requirements, and to make acquaintance with the limits of technical methods of reproduction, so that they may be in a position to deal with many questions which arise in the preparation of a map regarding the most suitable mode of presentation of data, a matter which is purely geographical, but which at the present time is too often left to the skilled draughtsman. Neither the compilation nor the reduction of maps are merely mechanical processes. The first requires great skill and care as well as technical knowledge and a sound method of treatment if the various pieces of work, which are brought together to make up the map of any considerable area, are to be utilised according to their true worth. This demands a competent knowledge of the work which has been previously done on the region, a first-hand acquaintance with the data collected by the earlier workers, and the critical examination of them in order that due weight may be given to the better material in the final result. This is not a task to be handed over to the draughtsman, who will mechanically incorporate the material as though it were all of equal accuracy, or will adjust discrepancies arbitrarily and not on any definite plan. Such preliminary preparation of cartographical material is a scientific operation which should be carried out by scientific methods and should be completed before the work reaches the draughtsman, who will then have but to introduce detail into a network of controls which has been prepared for him and of which the accuracy at all points has been definitely ascer-

tained. Similarly in the second case the elimination of detail which must of necessity be omitted is an operation needing the greatest skill, a full understanding of the material available, and an adequate appreciation of the result which is being aimed at, such as is only to be found in a competent geographer who has made himself intimately acquainted with all the material which is available and has his critical faculty fully developed.

The use of maps has steadily increased of recent years, but we should look forward to an even more widely extended use of them in the future; and this will be greatly facilitated if there are geographers who have made themselves masters of the technique of map reproduction and, as scientific geographers, are prepared to select such data as are needed for any particular class of map on a well-considered method, and not by the haphazard procedure to which the want of a scientific study of cartographic methods must inevitably lead. The paucity of papers dealing with practical cartography and the compilation of maps is clear proof that this branch of the subject awaits far more serious attention than it now receives.

All these problems are well within the reach of the geographer to whom the opportunity of travel in other regions does not come, and in them he will find ready to his hand a field of research which is well worth working and which will amply repay any labour that is spent upon it. The same precise methods of investigation which are employed in the discussion of observations should be applied to all cartographic material in order to ascertain the exact standard of its reliability, in which is included not only the correctness of distance and direction, but also the accuracy of the information which has been incorporated in it; and these may be brought to bear also on those early maps of which so many are preserved in our libraries in this country. In this field of study several investigators have already achieved results of great interest and value, but I think that they will be ready to admit that there is here a wide and profitable field of activity for many more workers who will study closely these early maps, and, not being contented with verbal descriptions, will use quantitative methods wherever these are possible.

In the study of map projections some activity has been visible in recent years, and we may hope that those who have worked in this branch of the subject will see that British Geography is provided with a comprehensive manual of this subject which will be worthy of the vast importance of cartography to the Empire. The selection of suitable projections is receiving much more attention than was formerly accorded to it, but the number of communications on this subject which reach geographical journals are few and far between. The subject is not one which can appeal strongly to the amateur geographer, but its importance renders it imperative that the scientific geographer who realises its intimate bearing upon all his work should so arrange that the matter does not fall into the background on this account.

A closer relation and a more active co-operation between those who are prepared to work seriously at cartography and its various problems

may reasonably be expected to raise the standard of that class of map which is used to illustrate books of travel, or works descriptive of a region. At the present time the inadequate character of many of the maps and plans which are reproduced in such publications shows clearly that the public demand for maps which have been compiled with a view to illustrating the volume in question is still very ineffective.

The whole subject of cartography, with its component parts of map projection, compilation, reproduction, cartometry and the history of its development, is so important, not only to the individual geographer but also for the advancement of scientific geography, that we should aim at fostering it and encouraging the study of it in every way, and it will be zeal of individuals rather than the benevolent aid of institutions which will achieve this.

But it may be suggested that the lack of activity in Mathematical Geography is due to the somewhat specialised nature of the subject, and to the fact that the number of those who have received an adequate mathematical training and are prepared to devote themselves to geography is few. When we turn to Physical Geography in its treatment of the land we do find a field which has been more actively worked, for this is just the one to which the traveller's and explorer's observations should contribute most largely, and where therefore their material should be utilised with the best results. Even here there is room for much more work of the detailed and critical type, which is not merely general and descriptive, but starts from the careful collection of data, proceeds to the critical discussion of them, and continues by a comparison of the results with those obtained in similar observations in other regions.

To take a single branch of Physical Geography, the study of Rivers, the amount of accurate material which has been adequately discussed is small. In our own country the rainfall of various river basins is well known through the efforts of a meteorological association, but the proportion of it which is removed by evaporation, and of that which passes into the soil, has only been very partially studied. Passing to the run-off, which is more easy to determine satisfactorily, the carefully measured discharges of streams and rivers are not nearly so numerous as they should be if the hydrography of the rivers is to be adequately discussed; for although the more important rivers have been gauged by the authorities responsible for them in many cases, the results have usually been filed, and the information which has been published is usually a final value but without either the original data from which it has been deduced, or a full account given of the methods of measurement which have been employed. For the requirements of the authority concerned such a record is no doubt adequate, but the geographer requires the more detailed information if he is to co-ordinate satisfactorily the volume discharged with local rainfall, with changes in the rates of erosion or deposition, and the many other phenomena which make up the life-history of a river. Here too it is usually only the main stream which has been investigated; the tributaries still await a similar and even fuller study. A valuable contribution to work of this kind exists in the hydrographical

study of the Medway and of the Exe which has been undertaken by a Committee of the Royal Geographical Society during recent years, and this may serve as a guide to other workers; but, however welcome such a piece of work may be, I should much prefer to see the hydrography of a tributary of a river system worked out by a geographer as a piece of individual work, just as the geology or the botany or the zoology of a single restricted area is investigated by those whose interests are centred in these subjects.

In the same way we still know too little of the amounts of the dissolved and suspended matter which is carried down by our streams at various seasons of the year and in the different parts of their course. This class of investigation does not need very elaborate equipment, and may provide the opportunity for much useful study, which may be extended as information is increasingly acquired. In this way when numerous individual workers have studied the conditions prevailing in their own areas, and traced them through their seasonal and yearly variations, we shall possess a mass of valuable data with which we may undertake a revision of the results which have been arrived at in past years by various workers from such data as were then at their disposal.

In this one branch of the subject there is ample scope for workers of all interests in the measurement of discharges, in the determination of level, and of the movement of flood waves, in determining the amount of matter transported both in suspension and in solution, in tracing out the changes of the river channel, in following out the variation of the water-table which feeds the stream, in ascertaining the loss of water by seepage in various parts of its course, and generally in studying the hundred other phenomena which are well worth investigating, and which give ample scope for workers of all kinds and of all opportunities. There is work not only in the field, but also in the laboratory and in the library which needs doing, for the full account of even a single stream can only be prepared when data of all classes have been collected and discussed.

On the Scottish lakes much valuable scientific work has been done, and also on some of the English lakes, so that excellent examples of how such work should be done are available as a guide to any one who will devote his spare time for a year or two in making a thorough acquaintance with the characteristics and phenomena of any lake to which he has access.

Coast-lines provide another class of geographical control which repays detailed study, and presents numberless opportunities for systematic investigation and material for many profitable studies in geography. The shores of these islands include almost every variety of type, and furnish exceptional opportunities for research of a profitable character, especially as lying on the border-line between the domain of the oceanographer on the one hand and the physiographer on the other. The precise methods of representation which are possible on the land have to give way to a more generalised treatment over the sea, and the shoreline is liable to be handed over to the latter sphere, so that there is much interesting and useful work open to any one who will make an

accurate and detailed study of a selected piece of coast-line, co-ordinating it with the phenomena of the land and sea respectively.

The teaching of Professor Davis in pressing for the employment of systematic methods in describing the landscapes with which the geographer has to deal has brought about a more rational treatment, in which due recognition is given to the structure of the area, and the processes which have moulded it, so that land forms are now for the most part described more or less adequately in terms which are familiar to all geographers and which convey definite associated ideas, in the light of which the particular description is adequately appreciated. It has been urged by some that such technical terms are unnecessary and serve to render the writings in which they occur intelligible only to the few; that any one should be able to express his meaning in words and sentences which will convey his meaning to all. There is no great difficulty in doing this, but in such descriptions to convey all that a technically-worded account can give to those who understand its terms would be long and involved on account of the numerous related facts which would be included. It is consequently essential in all accurate work that certain terms should have very definite and restricted meanings, and such technical terms, when suitably chosen, are not only convenient in that they avoid circumlocution, but when used in the accepted sense at once suggest to the mind a whole series of related and dependent conditions which are always associated with it.

The compilation of a glossary of geographical terms has been in progress in this country for many years without having reached finality, and much of the difficulty which has been experienced is doubtless due to the fact that so many words have not been consistently used with a well-defined meaning. Such looseness of expression is more liable to occur in the case of foreign words which have been imported in the first case by writers who are not scientifically trained, and therefore do not use them in connection with a specified set of conditions. This, however, is unimportant if only scientific geographers, when they accept a term as a desirable addition to the geographical vocabulary, will associate it definitely with such conditions and use it consistently in that connection. As an instance I may quote the word "sadd," which etymologically means to block, or stop. This term was naturally and reasonably used to indicate masses of uprooted marsh vegetation which had been carried along by the current and, if checked at a sharp bend or a narrow point of the stream, blocked the channel. So long as it is used in this restricted sense it is a useful term to describe a phenomenon which occurs under certain definite conditions and which leads to equally well-defined geographical results. This use of it is associated with a meandering river channel in an alluvial flood-plain, where shallow lagoons occur, in which such marsh vegetation grows luxuriantly; when this vegetation is uprooted by storms and carried by the rising water into the main stream it provides the drift material which makes up the block or "sadd."

But this term has been extended immoderately to mean the region in which these physical conditions occur, or the type of vegetation which

grows under these conditions, and even the type of country where such conditions prevail. One writer has even used the word in describing fossil vegetation of a character such as is associated with marsh lands.

The crystallisation of such geographical terms into true technical terms is an important step in the furtherance of scientific geography, but it must be done by the geographers themselves, and no means of doing this is more fruitful than the work of original research and investigation in definite areas or on specific problems.

It would take too long to discuss each branch of physical geography and indicate the opportunities for individual effort, but what has been said of one may be said of all the others. Not only in all parts of the Empire but in these islands also there is ample opportunity for the detailed geographical study of single localities or individual phenomena, just as much as in geology, in botany, or in zoology; and it is these separate pieces of work which, when thoroughly carried out and critically discussed, provide the material on which wider generalisations or larger investigations can be based. Herein lies, therefore, the importance of the prosecution of them by as many workers as possible, and the value of communicating the results to others for criticism and for comparison with the results which they have obtained; for such work, if it cannot be made accessible to other workers in the same and related fields, loses a large proportion of its value.

If we now consider some of the problems of human geography we shall find the need for such systematic study to be even greater; for the variable factors involved are more numerous than in physical geography, and many of them are difficult to reduce to precise statement; the quantitative study of the subject is therefore much more difficult than the qualitative or descriptive, so that the latter is too frequently adopted to the exclusion of the former. The remedy lies, I believe, in individual research into special cases and special areas where the factors involved are not too numerous, where some of them at least can be defined with some accuracy, and where, consequently, deductions can be drawn with some precision and with an accuracy which gives ground for confidence in the result. The settlements of man, his occupations, his movements in their geographical relations, are manifested everywhere, and subjects of study are to be found without difficulty, but their investigation must be based on actual observation, and on data which have been carefully collected and critically examined, so that the subject may be treated as completely as possible, and in such a way that the evidence is laid before the reader in order that he may form his own conclusions.

It is probable that some of the lack of precision which is to be found in this part of the subject is to be attributed to the want of precision in its terminology. For many things in human geography good technical terms are required, but these must be selected by those who have studied the type or phenomenon concerned and have a clear idea of the particular conditions which they desire to associate with the term: this is not the work of a Committee of Selection, but must grow out of the needs of the individual workers.

There is, it must be admitted, no small difficulty in using the same preciseness of method in this portion of the subject as is readily attainable in mathematical geography, and is usually practicable in physiography; but at any rate it is undesirable to indicate any condition as the controlling one until all other possible influences have been carefully examined and have been shown to have less weight than that one which has been selected.

Whether the investigation deals with the settlements of man or his movements and means of communication it is important that in the first instance problems of a manageable size should be undertaken and thoroughly treated, leaving larger areas and wider generalisations until a sufficient stock of thoroughly reliable material which is in the form in which it can properly be used for wider aims is available.

The relation of geographical conditions to small settlements can be satisfactorily worked out if sufficient trouble is taken and all possible sources of information, both of present date and of periods which have passed away, are utilised. Such studies are of a real value and pave the way to more elaborate studies, but we need more serious study of these simpler cases both to set our facts in order and to provide a methodical classification of the conditions which prevail in this part of the subject. Out of such studies there will grow such a series of terms with well-defined associations as will give a real precision to the subject which it seems at the present time to lack.

The same benefit is to be anticipated from detailed work in relation to man's communications and the interchange of commodities in all their varied relations. Generalised and descriptive accounts are readily to be found, and these are for the most part supported by tables of statistics, all of which have their value and present truths of great importance in geography, but the spirit of active research which aims at clearing up thoroughly a small portion of the wide field of geographical activities has unequalled opportunities in the somewhat shadowy relations between the phenomena which we meet in this part of the subject, for focusing the facts better, and obtaining a more exact view of the questions involved.

Where the geography of States (political geography) is concerned the same need for original investigation as a basis for generalisations may be seen. At the present time there is much said about the various boundaries of States, and in general terms the advantages and disadvantages of different boundaries under varied conditions can be stated with fair approximation to accuracy. But I do not know of many detailed examinations of these boundaries or portions of them where full information of all the factors involved can be found set out in an orderly and authoritative manner, thus forming a sure foundation for the generalised description and providing the means of verifying its correctness or revising it where necessary.

Perhaps there is really more scientific research in geography being undertaken by individuals than I have given credit for, but certainly in geographical periodicals, and in the bibliographies which are published annually, the amount shown is not large; neither is the number of

authors as large as might be expected from the importance and interest of the subject and from the activity of those centres where geography is seriously taught. There seems to be no reason why individual research on true scientific lines should not be as active in geography as it is in geology, botany, zoology, or any other branch of knowledge; and, just as in these, the real advance in the subject is dependent on such investigations rather than on travels and explorations in little-known lands, unless these too are carried out scientifically and by thoroughly trained observers who know the problems which there await solution, and can read the evidence which lies before them on their route.

If research in these directions is being actively prosecuted, but the appearance of its results is delayed, let us seek out the retarding causes if there be any, and increase any facilities that may be desirable to assist individual efforts.

Short technical papers of a thoroughly scientific character, such as are the outcome of serious individual research, are, of course, not suitable for those meetings of Geographical Societies where the majority of the Fellows present are not scientific geographers, but should be presented to small meetings of other workers in the same or allied fields, where they can be completely criticised. The reading, discussion, and the publication of papers of this class are for geography a great desideratum, for it is in them and by them that all real advance in the subject is made, rather than by tales of travel, however interesting, if these are not the work of one trained in the subject, having a knowledge of what he should observe, and of what his predecessors have done in the same field. The regional aspect of geography in the hands of its best exponents has given to young geographers a wide and comprehensive outlook on the interaction of the various geographical factors in a region, the responses between the earth's surface and the life upon it, and the control that one factor may exercise upon another. In this form the fascination of geographical study is apparent to every one, but I sometimes wonder whether the exposition of such a regional study by one who is thoroughly master of the component factors, having a first-hand knowledge of all the material involved, and knowing exactly the reliability of each portion, impresses sufficiently upon the student the necessity of personal research into the details of some problem or phenomenon in such a way as to gain a real working acquaintance with them; or does it on the other hand tend to encourage generalisations based on descriptive accounts which have not been verified, and where coincidences and similarities may be accepted without further inquiry as evidence of a causal connection which may not really exist? I imagine that the student may be attracted by the apparent simplicity of a masterly account of the geographical controls and responses involved, and may fail to realise that geographical descriptions, even though technically phrased, are not the equivalent of original quantitative investigation, either for his own education or as a contribution to the subject.

For these reasons I believe that Societies can do far more good in the promotion of geography as a science by assisting competent investigators, by the loan of books and instruments, and by giving facilities for

the discussion and publication of technical papers, than by undertaking the investigation of problems themselves.

Among the earlier Presidential Addresses of this Section some have laid stress on the importance of the recognition by the State of geography in education; others have represented the great part which the Geographical Societies have played in supporting and advancing the subject; others again have urged the fuller recognition of geography by Educational Institutions. I would on this occasion attach especial importance to the prosecution of serious research by individuals in any branch of the subject that is accessible to them, to the discussion of the results of such work by others of like interests, and to the publication of such studies as having a real value in promoting the advancement of scientific geography.

THE ECONOMIC GEOGRAPHY OF JAPAN.[1]

By Professor K. Oseki.

(*Continued from p.* 465.)

Barley and Wheat.—This group includes bearded barley, wheat, and ordinary or naked barley. These cereals are hardier than rice, and have, consequently, a wider distribution, growing even in the far north, in Karafuto (Sakhalien), with the exception of wheat, which does not repay cultivation in so cold a climate.

In the three main islands these crops generally follow rice on the paddy fields. This is especially the case in south-western Japan, and attains a maximum in Kinki, where the proportion of paddy fields to dry fields = 4 : 1. In Chiugoku, northern Shikoku and northern Kiushiu also, paddy fields predominate. The greatest yield of these cereals, however, is from the Kwanto and Kiushiu districts, which furnish between them half the total amount of the barley crops grown in Japan.

The southern islands are of less importance as sources of these food stuffs—Taiwan even, with its fairly large farms, produces but scanty crops of wheat and barley, while the southern Riu Kiu Islands—administered under the name of Okinava Ken—yield but very small amounts, and cannot be expected to increase their output. Chosen, on the other hand, is capable of much further development as a wheat and barley-growing land, but the actual area under crops is, as yet, comparatively small—only about 400,000 chobu (9,800,000 acres), which yielded in 1909 a harvest of 3,640,000 koku (= 18,000,000 bushels)—about one-seventh of the whole wheat and barley yield. The following table shows the area, production and average yield per tanbu in 1903 and 1912. [As before, the normal crop is calculated from the average of seven normal years + an abnormally good and a correspondingly bad year.]

[1] I have to acknowledge the kind assistance rendered me by Miss M. K. Heslop, M.Sc., in connection with the composition of this paper.—K. O.

AREA (in Chobu).

	Barley.	Naked Barley.	Wheat.
1903, . .	658,115·0	671,324·2	469,906·9
1912, . .	598,100·5	680,058·9	496,331·2
Normal Area, .	632,641·2	685,496·5	452,722·6

TOTAL PRODUCTION (in Koku).

1903, . .	7,462,220	4,207,497	1,875,388
1912, . .	9,790,709	7,900,112	5,179,500
Normal Crop, .	9,368,394	7,260,362	4,383,158

AVERAGE YIELD (in Koku per Tanbu).

	Barley.	Naked Barley.	Wheat.
1903, . .	1·134	0·627	0·977
1912, . .	1·637	1·162	1·044
Normal Crop, .	1·481	1·059	0·968

Consumption of Barley and Wheat in Japan.—Both varieties of barley are grown merely for home use, and have no place among articles of commerce. Wheat, on the other hand, is so extensively used that the home produce cannot meet the demand, so that wheat to the amount of about 400,000 koku (one-tenth of the whole wheat crop in 1911), has to be imported. Three-fifths of the foreign supply comes from the United States, while Australia and Canada furnish the remaining two-fifths. Wheat flour too is brought from America and Canada to Japan. In 1912 the quantity rose to 280,000 bushels, and was valued at 1,720,000 yen (£172,000 approx.), but most of the flour is milled in Japan from wheat brought from abroad.

The whole Korean crop is consumed at home, and is sufficient for the demand; there is therefore no export or import trade in these food stuffs in Korea.

The following table shows the area and production for barley and wheat in Korea:—

Area	1909,	391,371 chobu (chobu = 2·45 acres).
	1912,	584,644 chobu.
Production	1909,	3,642,023 koku (koku = 4·9 bushels).
	1912,	5,596,846 koku.

Other Crops.

The soy bean is very useful: it is an important food, and the refuse makes a valuable manure. Although it is largely grown in the northern islands and on the drier uplands in the southern districts, the demand still exceeds the supply, so that cargoes of beans have to be brought from abroad—chiefly from Manchuria, which is the best known centre of soy bean cultivation. There are vast fields of the plant in the inland regions to the north-west of the Korean boundary. The produce is taken south by rail, and shipped either from Dalny or from the southern extremity of the Korean peninsula. In 1912 this import was valued at 23·52

million yen—about £2,400,000—while the bean refuse was worth about £1,000,000.

The small red bean, like the soy bean, grows on the drier inland slopes, while barnyard- and foxtail-millet are grown in the mountain districts of the interior, taking the place of rice as the staple food of the inhabitants—especially the poorer folk—in some districts.

Proso-millet and buckwheat are next in importance, but as they are grown only in sufficient quantity for home consumption, there is no margin for export. Potatoes have been cultivated for ages, chiefly as a safeguard against famine. They are most abundant in the north, while the sweet potato ("Satsuma Imo") is grown in the south and in Taiwan and the Riu Kiu Islands. Potatoes constitute the food of the poorer classes in the intervals between the rice crops.

Peas, beans, and ground nuts are common throughout Japan. The last supplies oil, which is exported on a small scale. Ginger, pickled bamboo-sprouts, and peppermint are among the best known Japanese vegetable products.

Fruits.—There is an extensive export of apples and oranges, although the cultivation of the apple dates only from the commencement of American influence in Hokkaido, some forty years ago, when American apples were introduced, superseding the small sour native apples. The southward extension of apple orchards is controlled by local climatic considerations, because a somewhat drier soil is required than is common in Japan. The fruit finds a market in the towns of eastern Asia—quite three-fourths go to Siberia. Oranges grow more luxuriantly, perhaps, than any other Japanese fruit. They flourish along the southern coastal slopes. There are many varieties of oranges—for the last ten years a Spanish type known as the navel orange has been most successfully grown. It came originally from California, and is now, curiously enough, largely exported to its native place. A very large orange ("Natsu Mikan"), grown in summer, is both popular and remunerative.

A variety of fig is grown in the Japanese Islands, and also the medlar, called "Biwa" in the native tongue. One of the best fruit-growing districts, both as regards climate and soil, is to be found in the several thousand islands of the Inland Sea. Here the cultivation is chiefly carried on by old men and women, as the majority of the younger men go to the Sandwich Islands as farmers and fishers. In Taiwan, the Riu Kiu, and Bonin Islands fruit is abundant and varied, and includes, besides several kinds of oranges, such tropical products as bananas and pine-apples.

Special Crops.

Of these, many merit a detailed description, but we must limit ourselves to short notes.

Cotton.—As we have already said, the cotton plant used to be cultivated in Japan. It was brought to the islands from the Iberian peninsula some three hundred years ago, but neither climate nor soil are

suitable for its growth to any considerable extent, so that there is not much hope of development for this side of the industry. We may therefore expect the present import of raw cotton for our textile manufactures to continue. In Chosen the case is different: cotton plantations are being greatly extended, especially in the southern part of the peninsula.

The annual import of raw cotton from British India is very great; in 1912 it realised about 108·67 million yen (about £11,000,000) out of a total of 198·93 million yen. About one-third of our cotton comes from the United States and one-tenth from China. It is hoped that at some future time Korea may be able to supply the mills of Japan with the raw material necessary for their textile manufactures.

Hemp, jute, and China grass are grown, but not in sufficient quantity to meet the demand, so that these materials have to be imported from China, the Philippines, and British India.

Native leaf *indigo* was once very much prized, but its cultivation is too costly to be carried on any longer on a commercial scale. It has therefore been replaced, to a certain degree, by German aniline dyes, only remaining as an industry in southern Shikoku and Taiwan. The Riu Kiu Islands produce a duller and less valuable variety called "mud indigo."

Tobacco was brought to Japan from the Iberian peninsula some time after Columbus introduced it into Europe from America. It now grows in Taiwan and Chosen (Korea), and throughout the islands to Hokkaido. There is an increasing demand for Japanese tobacco in the form of cigarettes, and these are beginning to make a little headway against American competition, which was particularly strong in China. Now, however, Japanese tobacco is sold even in Tibet. We do not make cigars, which come to us chiefly from America, Canada, and the Philippines.

Trees and plants the bark of which can be used for *paper-making* are cultivated at the base and on the slopes of volcanic hills, where the soil is specially suitable. Paper-making is a very valuable industry, so that the growing of these trees is a matter of some importance; and now even characteristically European papers are made in Japan from the pulp of native trees. In Taiwan and Chosen coarser papers are made from straw and bamboo fibre.

The cultivation of the *wax tree* was once encouraged by the nobles, in the days when the export of vegetable wax was much more extensive than it is at present. The tree is still grown in the south-west—in Shikoku and Kiushiu, and in the western end of Honshiu. The wax is used in European laundries for glazing.

There is a considerable export of *mats* to America. They are made from the rushes which grow so abundantly in the south-western parts of the main islands.

The *lacquer tree* was once, like the wax tree, protected by the influence of the nobles who patronised the lacquer industry as the most characteristic national accomplishment, rising, in some of its branches, to the level of a fine art of a very high order. As the demand for

lacquer is increasing, special measures are taken to ensure a future supply by planting new trees. At present the home growth is deficient, and Chinese lacquer has to be imported, but it is not so satisfactory as the Japanese variety. This defect should certainly be remedied in time, as there is no climatic obstacle to the cultivation of these trees throughout the length and breadth of the three main islands, so it is hoped that the native tree may yet, with care, be able to supply the entire Japanese industry with raw material. At present only in the central highlands of Honshiu—along the foot-hills and on the lower slopes—is the tree extensively planted.

Sugar cane, like so many other plants, came eastward from the Iberian peninsula. It grows best in the warmer districts—in the Riu Kiu and Bonin Islands, and Taiwan, and on the southern slopes of the main islands. Before the acquisition of Taiwan (Formosa), the sugar problem was a serious one. In spite of all efforts to extend the plantations on the mainland, large quantities of sugar had to be imported, and even for ten years after Taiwan was ceded to us, while improved methods of cultivation were being tried in that island, and before the yield had begun to respond to the increased expenditure of labour, Japan imported enormous quantities of sugar.

In 1910 the home grown sugar amounted to 262,000 tons, of which 58,000 tons were produced in the Main Islands and 204,000 in Taiwan, and the imported sugar to 119,000 tons, giving a total consumption of 381,000 tons. There are sugar refineries in many of the large towns on the mainland: in Taiwan, however, only the initial stages of the refining process are carried out, and there is a very extensive trade in the products of these preliminary processes. The import of foreign sugar is unavoidable just now; in 1912 it was valued at 16 million yen (£1,600,000), of which a quantity, worth 14 million yen, was brought from British India. The Philippines, China, and the Dutch East Indies also supply large amounts. The last-named were more important as a source of sugar in former years than they are at present.

Tea.—The climate and rainfall in Japan renders it particularly favourable for tea-growing, except perhaps in the extreme north, but even there experiments are in progress which may lead to the establishment of the tea plant in Hokkaido. Thus we may hope to see tea flourishing throughout the islands. The plant came originally from China, about seven hundred years ago, but by isolation in the peculiar climate of these islands it has acquired quite a characteristic flavour. Besides its own intrinsic value, the tea plant is most useful in preserving the soil on slopes which are steep enough to run the risk of being denuded of their loose earth by heavy rains. Its usefulness in this direction is, however, controlled by the nature of the ground. Granitic areas are not favourable for tea growth, because the slow disintegration of the surface restricts the development of soil very seriously. No appliances are necessary for tea-growing, nor any expensive apparatus, and the financial returns—about £20 an acre annually—quite repay the labour expended in tending the plants and picking the leaves. Climatic accidents, such as storms, do not have so terrible an effect

upon this, as upon many other Japanese crops (for the bushes are hardy), and the only real danger comes from swamping or washing away by excessive rain. Tea-growing is concentrated on the southward-facing slopes around the Inland Sea, along the south coast—especially in the Shizu-oka Ken, in Kioto Fu, and in the Kinki Peninsula: Chiugoko, Shikoku, and Kiushiu are also well-known tea-growing districts. The finest tea (green tea) is limited to Kioto Fu, and is used almost exclusively by the Japanese. It was to Kioto that the first tea bushes from China were brought, bearing the poetic name of Giukuro, meaning "Jewel dew." There are many kinds of tea: green tea, black tea, the Oolong and Pautchum teas. Black teas are cultivated almost entirely for export; the chief centres of this industry are Shigu Oka and Min.

The following table shows the production and export of tea in 1902 and 1911:—

	Production in Kin.	Export in Kin.	Excess of production over export.	Ratio of consumption to export.	Value per 100 Kin.
1902 . .	42,396,425	32,759,580	9,636,845	23 : 77	32 ken
1911 . .	52,967,463	32,187,594	20,779,869	39 : 61	45 ken

1 kin = 1·322 lbs.

Most of the exported tea, quite 80 per cent., goes to the United States. Only about 1 per cent. goes to British North America, while China and the British Isles take small quantities. The tea plant is of the utmost importance to Taiwan, which produces no less than half of the tea of Japan, and of this enormous quantity four-fifths is of the variety known as Oolong, for which the Tai-hoku valley is famous, while the remainder is mostly Paochung tea.

Silk.—The silkworm was brought to our islands from Korea over a thousand years ago, and has flourished in Japan ever since. In olden days silkworm culture was under the direct patronage of the Empress and the Princesses of the Imperial family, who kept silkworms of their own, and encouraged the industry by personal example. At the present day, mulberry trees (on the leaves of which the worms feed) are planted on all the available slopes throughout the land, and might also be grown in the drier inland regions. Extremes of temperature such as are found in Karafuto (Sakhalien) and Taiwan (Formosa) do not agree with the worms, although an extension of the industry is being attempted in the latter island. Korea is the original home of these creatures, and consequently provides them with a suitable environment. Mulberry trees grow best on fairly dry soil, a condition which is best realised in the central parts of Japan, along the foot-hills that surround the Kwanto Plain, and all over the low plateau that extends along the great east-west synclinal axis on both sides of the Inland Sea. The most densely covered land lies in Nayano Ken where about one-tenth of the surface is planted with mulberry trees. It is situated, too, in the midst of counties which also specialise in silk.

There are three periods of what may be termed silk harvest; the cocoons are extracted in spring, in summer, and in autumn. The spring yield is by far the most abundant, giving about 60 per cent., while summer gives only 12 per cent., and autumn 27 per cent. The low summer return is partly due to the fact that high temperatures do not stimulate the worms to greater efforts, moreover insects are troublesome, and as the farmers are busy at this season with their other crops, the silkworms do not get their full measure of attention. It may be mentioned here that the mulberry tree is cultivated in Japan exclusively as food for the silkworm.

TABLE showing the distribution of mulberry trees in Japan, and the production of cocoons.

	Area under Mulberry Trees.	Production of Cocoons.
1903, .	319,176·8 chobu	2,033,842 koku
1912, .	453,626·6 ,,	3,431,060 ,,

There are several kinds of cocoons—cocoons proper (used for silk yarn), double cocoons, pierced cocoons, and waste cocoons.

	Double cocoons.	Per cent. of whole.	Pierced cocoons.	Per cent. of whole.	Waste cocoons.	Per cent. of whole.
1903	266,628 koku	...	51,587 koku	...	198,167 koku	...
1911	446,708 ,,	10 p. cent.	65,059 ,,	9 p. cent.	292,463 ,,	7 p. cent.

Total Production of Silk.

1903. 2,549,224 koku.
1911. 4,235,290 koku, valued at 151,866,519 yen,—about £15,000,000.

The average value of pure cocoon silk in 1911 was 41 yen (over £4) per koku: double cocoon silk brought 16 yen and pierced cocoon silk 14 yen, and waste cocoon silk 13 yen per koku.

Some other kinds of cocoons, such as those of *Antheræa Yamamai* and *A. pernyi*, are obtained in various places: the latter is characteristic of inland districts.

TABLE showing production, export, etc., of raw silk.

	Production.	Export.	Excess of production over export.	Percentage consumed at home.	Percentage exported.	Value of exports.	Value per 100 kin.
	Kin.	Kin.	Kin.			Yen.	
1902	12,089,000	8,078,166	4,010,834	33	67	176,859,478	951 yen.
1911	21,341,500	14,456,047	6,885,453	32	68	128,875,094	892 yen.

About 1½ million households are engaged in this industry in all its branches.

TABLE showing number of households occupied with silk industry, and the quantity of silk produced.

	Raw Silk.			Waste and other Silks.	
	No. of households.	Quantity of silk in Kwan.[1]	Price in Yen.	Quantity.	Price in Yen.
1902	414,340	1,934,240	99,892,239	623,938	4,944,631
1911	370,332	3,414,640	171,426,771	1,040,285	5,577,126

	Total quantity in Kwan.	Total Price in Yen.
1902.	2,558,178.	101,836,870 (=£10,000,000 approx.).
1911.	4,454,925.	178,003,897 (=£18,000,000 „).

With regard to the countries to which Japanese silk is exported—of the quantity sold in 1912 (for over 150 million yen), the United States took over 115 million yen worth, France bought to the value of 18 million yen, and Italy of 14 million yen, while Russia took silk to the extent of 2·2 million yen.

TABLE showing the Production of Raw Silk in the Principal Countries of the World.

	In 1902. Thousand Kilograms.	In 1911. Thousand Kilograms.
France,	570	402
Italy,	4,477	3,490
Spain,	78	88
Austria-Hungary,	312	355
Total,	5,437	4,335
Australia,	503	510
Syria, Cyprus,	540	515
Other Countries of Asiatic Turkey,	...	135
Salonica and Adrianople,	190	365
Bulgaria, Servia, and Rumania,	130	195
Greece, Crete,	65	65
Caucasus,	465	480
Persia and Turkestan (Exports),	550	550
Total,	2,443	2,815
Shanghai (Exports),	3,600	5,550
Canton (Exports),	2,249	1,690
Yokohama (Exports),	**4,770**	**9,200**
Calcutta and Bombay,	295	215
Total,	10,884	16,655
Grand Total,	**18,764**	**23,805**

[1] 1 kwan = 8·267 lbs.

In conclusion, we may mention that there is a small import of silk from China—some raw material and cocoons, and also a little tussau (Shantung) silk.

Horse, Cattle, and Poultry Rearing.

Tradition affirms that many of the domestic animals of Japan were brought from the mainland in prehistoric times, but there are reasons for believing that the present native types are of mixed breed, and that they are the descendants of an imported and an aboriginal stock. Communication with Asia was intermittent, and although the Japanese fauna has undoubted affinities with that of the mainland, the island type has acquired—probably by isolation and the influence of the peculiar topography of Japan—special characteristics of its own. The animals are smaller and tamer than their relatives in China and Korea.

Many myths and legends attach to the domestic animals, carved effigies of which are seen around tombs. The necessity of improving the horses became very urgent during the wars of feudal times, so some of the greater chiefs imported breeds from South-western Asia, about three hundred years ago. Horses are much prized: the advent of a foal in a stable is considered an event of sufficient importance to bring the owner the congratulations of his friends, while the death of a horse is regarded as a loss, serious enough to warrant a formal expression of condolence. These animals, in fact, rank as humbler members of the human family, and receive much more consideration than is usually accorded to horses in other lands.

The rearing of domestic animals is limited by several somewhat serious considerations: (1) The concentrated system of agriculture which prevails in most parts of the country, and the nature of the crops raised, require human labour to such an extent as to oust almost entirely both animal and mechanical auxiliaries. Thus animals are but little used for farm work except in Hokkaido. It is noteworthy, however, that as the regime of agriculture is now nearing its zenith, and is facing perhaps rather decline than extension, there may be a tendency for farmers now growing grain crops and rice to turn their attention to the rearing of cattle and horses. As the Japanese have a fixed dislike to leaving the abode of their forefathers, this change is likely—indeed certain, in many cases—to take place "in situ": so that much land now under crops may, in the future, become pasture.

(2) As a consequence of the first condition, the space available for cattle and horse rearing is very small, all the level ground being claimed for food crops and the settlements of the cultivators. Such animals as are kept in these districts degenerate from lack of proper exercise and of their natural environment. They are always and unavoidably the victims of the system of which they are a part—housed in the home buildings and cooped in the narrow confines of small fields, deterioration of physique is but a natural result. Neither is there any way of improving their condition to any appreciable degree, for the maximum extent of waste ground which might be used as pasture does not exceed 5¼ per cent. of the whole surface of the country.

(3) The demand for meat is usually small in Japan—see the following table—as compared with other lands, so that the raising of stock for food is not a particularly remunerative occupation. Owing to economic conditions, however, the growth of towns, and foreign influence, there is an ever-increasing consumption of meat, so ranching may possibly be more profitable in the future, especially as the price of fish —the alternative animal food of the Japanese—tends to rise.

TABLE showing the annual consumption of meat per head in some of the most important countries of the world at the beginning of this century.

U.S.A.	Great Britain.	Ireland.	France.	Germany.	Austria-Hungary.	Russia.	Italy.	Japan.
150 lbs.	118 lbs.	56 lbs.	77 lbs.	64 lbs.	61 lbs.	51 lbs.	26 lbs.	1·8 lbs.

The following figures show the number of cattle and pigs slaughtered in Japan in 1902 and 1911 :—

	Cattle	Calves	Pigs
1902, . .	196,909	9,121	124,263
1911, . .	261,502	17,025	229,275

With regard to dairy produce, it may be mentioned that the demand for it dates practically from the advent of foreign influence. Increasing quantities of milk and butter are needed, especially in the large towns, so that a continual import both of domestic animals and dairy produce is necessary to cope with the demand. In 1908 this import reached a value of 1,500,000 yen, while in 1909 it had risen to 1,800,000 yen. Not only are more people using milk, but the quantity used per person has increased. These goods make up about 5 per cent. of the total imports. Condensed milk, eggs, hides, skins, and leather are also brought in large quantities from abroad ; but the most prominent of the animal-produce imports is wool. As we have already said, poultry-rearing is in the hands of the old women and children of farming households and does not tend to develop as a separate industry.

Horses.—There was no specialisation in horses in bygone days, but the animals were indiscriminately set to do whatever work their masters desired. It is only of recent years that such special types as farm horses and riding horses have been recognised, and classified under the head of heavy- and light-work horses. Although the feudal knights had no objection to taking their steeds from farm work to ride in battle array, and were apparently indifferent as to the build of an animal or its adaptability to its task, yet even in those days two more or less distinct classes of horses came to be recognised ; (1) those of South-western Japan, allied to the Korean type, short and stumpy ; (2) those of the northern districts, in which the aboriginal breed was strongly influenced by the type of Western Asia introduced

by the famous warrior, Date Masamune, in the early part of the seventeenth century. The foreign animals were first herded on the fairly low Tertiary plains of northern Honshiu, where there is much good natural pasture with clear streams, shady woods, and some variety of surface. This part is still the focus of the new efforts at horse-breeding. The renewed activity in this direction is due to the demand for army horses, and has developed practically since the Russo-Japanese War: certainly this event gave a great impetus and an added importance to the effort to raise a good breed of horses in Japan.

All horses belong to the Government, and are only lent to the farmers and tradesmen who work them. They are by no means evenly distributed over the country; quite 39 per cent. are gathered together in northern Honshiu and Hokkaido,[1] and there is a fair number in southern Kiushiu, but in many districts they are very rare or absent.

TABLE showing the number and classes of horses in Japan.

	Native.	Cross bred.	Foreign.	Total.		
				Horses.	Mares.	Total.
1902	1,414,566	78,805	1737	663,898	871,210	1,515,108
1911	1,160,399	401,454	14,293	690,899	885,241	1,576,146

The principal states from which horses are now imported are Australia, England, and Austria-Hungary.

The following statistics show the application of horse and cattle labour in agriculture:—

	Paddy fields using animal labour.		Whole area of paddy fields.	Dry farms using animal labour.		Whole area of dry farms.
	Chobu.	Per cent.	Chobu (= 2·54 acres).	Chobu.	Per cent.	Chobu.
1908	1,638,028	57	2,873,562	989,418	38	2,630,761

About 74 per cent. of the cattle, and 83 per cent. of the horses are used for agricultural work, and each farm has, on an average, about four head of cattle and five horses.

Cattle.—Unlike horses, cattle tend to accumulate most densely, and to become of greatest importance in the south-western part of the mainland: quite 50 per cent. are concentrated in Kinki and Chiugoku. The reason for this is to be found in the very suitable pastures which cover the low plateaux of these regions, where the comparatively warm climate and heavy rainfall produce a rich herbage. Topography and climate control the distribution of cattle, but the northward limit of grazing is fixed chiefly by the shortness of the summer in higher

[1] N. Honshiu is the centre of the horse-rearing movement, while the American method of farming which prevails in Hokkaido needs much animal labour.

latitudes. Cattle are imported in about the same numbers as horses, but there is perhaps a somewhat greater demand for the former on account of their more manifold and varied uses.

Though the improvement of stock and the scientific rearing and breeding of cattle are being seriously taken up, the task is undoubtedly restricted, to a certain extent, by the high price of European and American animals—the best breeds: nevertheless, considerable numbers are brought from the British Isles, Holland, Switzerland and other Western lands. There are several model ranching establishments where experimental work is in progress.

TABLE showing the number and kinds of cattle in Japan.

	Native.	Crossbred.	Foreign.	Total.		
				Male.	Female.	Total.
1902	1,129,787	124,706	20,888	479,731	795,670	1,275,381
1911	899,428	477,998	27,600	477,610	927,416	1,405,026

In Taiwan (Formosa) the most important domestic animals are the buffalo and a kind of zebu called the "yellow ox." In the island generally ordinary cattle, either of pure or mixed breeds, are very rare: and there are a few horses used indifferently for farm work and as carriers. Small flocks of sheep and many goats (see p. 531) are grazed on the hill slopes. Pigs, however, are very important, and are bred in great numbers by the Chinese inhabitants both of Formosa and the Riu Kiu (Loo Choo) Islands. The following table gives the numbers of the three important kinds of animals in Formosa.

	Buffaloes.	Zebus.	Pigs.
1902, . . .	178,746	77,069	779,179
1911, . . .	308,760	168,334	1,290,387

In Chosen (Korea) horses and donkeys of a very stunted type are much used both for farm work and for traffic. There are very good breeds of cattle in the peninsula, and much attention is bestowed upon them, partly because they are used as food, and partly on account of the growing importance of such industries as tanning, leather work, the fashioning of implements of horn and bone, and also the preparation of manure from these substances. Though poultry-rearing has no independent existence, but is a subsidiary department of farming, there are, nevertheless, large numbers of fowls, geese, ducks, and other poultry in all parts of the country. The yield of eggs is not large enough to supply the demand, so eggs have to be imported from China, both for eating and for the chemical industries in which they are used.

It is very unfortunate for Japan that its flock of sheep is so small—necessarily so, on account of the very rugged surface, the damp climate, and the nature of the soil. There are only about 4000 sheep in the

whole land, scattered widely over the upland volcanic regions: and there is little prospect of an increase in their number at present. This is a serious economic disadvantage, for in 1912 the wool imported was valued at over 16 million yen—about £1,700,000. Of this enormous quantity, half came from Australia, and a little less than half from the United Kingdom, while small amounts were brought from China and Germany.

Goats are fairly numerous, especially in Taiwan, where, in 1911, they numbered about 130,000, out of a total of under 230,000 for the whole of the Japanese islands.

THE SO-CALLED MYTHICAL ISLANDS OF THE ATLANTIC IN MEDIEVAL MAPS.[1]

By William H. Babcock.

The Crescent Island of Man.

This island (otherwise Brazir, Mam, Mayda, Asmayda, Bentusle, Bolunda, and Vlaanderen) does not appear in the maps of Dalorto, Dulcert, or Gaddiano (the *Atlante Mediceo*). Its entrance on the scene, as the records stand, is more than forty years later than that of Brazil: thereafter it becomes an almost inseparable consort of the latter for several centuries. When either is absent, both are absent; and when both are present, this Man, by whatever name, usually lies south-west or west of south of Brazil, the distance being variable in some instances, but fairly constant as a rule. It sometimes approaches a half-moon in contour, is sometimes a mere shred or paring of a crescent, but more often has an intermediate form, being nearly always rounded smoothly on one side, and concave or nearly straight on the other, which is more or less indented as if by bays, and in a majority of cases turned to the north-west. Its names are numerous, but at first Man predominates, and in later centuries Mayda, with slight variations in each case. Neither of these names, however, was the earliest which it bore, so far as we know.

Step by step the delineation of the eastern Atlantic island-clusters and island-series had proceeded, until the *Atlante Mediceo*, 1351, showed in full the Canaries, the Madeiras, and the Azores, in the majority of instances with their present names, and marshalled correctly the sub-groups of the latter archipelago, two islands in the lowest group, five in the middle, two more in the outermost. It erred only in relative direction, distance from Europe, and some details of size and form.

Then there was a curious interruption of the chain of development. The map of the Pizigani brothers appeared in 1367, and was conspicuous at once for its apparent ignorance of what others had thus learned in

[1] For earlier articles see p. 111 *ante*.

regular gradation, and for strange new flashes of original light on geography, obviously from quite novel sources. Perhaps its most notable addition was the island Brazir, imperfectly crescentic in form, far south-west of the circular Irish Brazil (here Brazir also), which from the first had held its place south of west of Limerick and off the Blaskets, and also very far west of Brittany, being almost exactly on the parallel of Quimper and the Point du Raz, here named Cabo de Fontano. The Isle de Sein, just above this headland, still bears that name. In other words, the latitude is about the forty-eighth degree, which Prunes in 1553 gives for this island on his graduated and numbered map. This agrees pretty closely with a considerable number of others earlier and later, though the island was occasionally shifted as far south as the mouth of the Loire, and more rarely as far northward as the upper Breton coast, or perhaps a little farther, such variations rarely exceeding a degree or two. This certainly leaves the impression of a very old, strong, and clear tradition connecting this island with Brittany: also with Ireland by way of Brazil, as though discoverers were believed to have reached it from these countries.

On the American side the parallel 48° traverses the Avalon peninsula of Newfoundland a little above Cape Race (once Capo de Raz) and Cape Breton, two of our earliest coast-names and main geographic pivots, obviously brought from the European Breton shore. There is no land whatever at any point between the two capes sometimes called Raz. The Atlantic Ocean is there, but at one of its narrower parts.

However, we should look lower for the region intended, since other western map-forms often appear too high in latitude, perhaps because the southward dip of the isothermal lines on that side of the sea was not well understood. Edrisi and his predecessors had divided the oblong known world into equal belts running east and west under the name of "climates," duly numbered for individual distinction, and it was easy for the idea to spread that such a belt had generally the same conditions of temperature from end to end. Minor distinctions might be made, but even yet, and in well-informed minds, the recognition of decided differences of heat and cold on the same degree of latitude usually gives rise to some surprise. Reports by mariners of the fifteenth century, of a western land with the climate of Brittany or that of Portugal, would ordinarily lead to its appearance on the map opposite the country named. Allowing for this, any real land which suggested the Crescent Island might be in southern New England or below. Comparison with the site of the Antillia inscription and statue-picture of the Pizigani map would not make this Brazir farther west than the Sargasso Sea. But perhaps the map-makers, being on quite unfamiliar ground, merely meant to mark what they considered the farthest point that had been reached by sailing—as indeed their inscriptions say—and cared little whether the distance corresponded or differed on the two parallels. We have seen reason to conjecture that the region about the St. Lawrence Gulf was the original of the mediæval island of Brazil, and as the Crescent Island is almost always shown more westward and more southward than Brazil, the logic of geography points to some nearly insular part of

the mainland coast, like Cape Cod, or some island or islands in American waters, like the Bermudas.

Notwithstanding its unique features, indicating special sources of information, this Pizigani map displays a curious poverty in data already widely known. Of the nine Azores, beside minor islets, only Terceira appears, and it shares the name Brazir with the Crescent Island and the circular or full moon island, the first and legitimate Brazil. Both by faults and merits, this map makes a gap of sheer originality in the orderly course of cartography, which confounds all attempts to work out in that way the time of discovery or subsequent visits which it means to indicate. They may have been understood as happening in almost any previous year. The island outline, it is true, has not yet taken the perfectly conventionalised form which it most often displayed afterward, and seems more like a real island; and this may indicate recentness: but that is hardly true of the inscriptions and monster-figures, and the roughness of the island may simply reflect the draftsman's preference or clumsiness. In mass it is much less than Brazil, as was usually the case afterward. The name Brazir is probably Celtic, as already explained, being simply a further modification of Breasail. But this is not all. Happily these early map-makers were picturesquely minded. Where we moderns give lines and names they added illustrative figures of kings and saints, mariners and savages, tents in desert places, ships and churches and sea-monsters, also symbols of divers kinds, and romantically credulous inscriptions relating to the surprising attributes of remote regions or what venturesome explorers had encountered among the perils of the deep. The Pizigani map is a remarkable example of this. In particular it uses, more fully than had been done before, the vessels of the different exploring countries, marked by their respective flags, to apportion the credit of discovery. It is not very difficult to identify them, because a practice had grown up of planting the standards at the proper strongholds on the maps.

Thus we recognise on the labouring galley near "Lancerote" (also cross-marked) the cross of Genoa, which had been borne there nearly a century before by the Genoese navigator and coloniser Maloessel, whose first name, Lancelot, still clings to it, a little modified. Also (less certainly indicative) we find a vessel with a Portuguese flag nearing home almost immediately opposite the inscription concerning the shores of Atillie (Antillia).

Yet again, we find on this map three ships, carrying Breton flags, in trouble near Brazir, opposite Brittany. The ensign may seem strange, but the incorporation of Brittany with France was yet incomplete; it enjoyed indeed an intermittent and precarious independence, and was rarely reduced to surrendering this for long. Thus it comes about that on the Dulcert map of 1339 the staff of the French banner is planted at the city of Paris, but the barred standard of Brittany at the Breton name of Nantes on the Loire, its fabric overspreading most of that peninsular province. The design is made up of horizontal bars and vertical bars. The small pennants on the pictured ships do not afford room for all; but the horizontal bars are displayed by the two ships near

the Crescent Island, and the vertical bars by the returning one which approaches the Breton coast. There could not well be a more explicit symbolic record of a Breton voyage across sea and back, with some appalling adventures.

For all did not return. A second ship has passed the island homeward with sails spread, making good its escape. But the other, though heading the same way, is reduced to bare masts and cordage, and is sinking by the stern, where a huge decapod pulls it down, as one of his tentacles is dragging a seaman overboard. Overhead a dragon flies past, with another kidnapped sailor in his jaws.

The picture parable of warning seems to need no comment, but the map-maker has not spared this. Three neighbouring inscriptions in blurred and corrupt Latin tell us that beyond this point (Brazir) there is no navigation, because the ships are perforated; also dragons come flying suddenly to carry men away, and tawny monsters of the Arabs, ominous to ships, arise from the depths. Both "Arabe" and "Arabour" unmistakably occur: "dragones" is repeated also; the word which I have translated "tawny monsters" is apparently "fulvos," though not perfectly plain. In spite of obscurities the general drift of the message is not to be mistaken.

Thus the Pizigani believed that a small Breton fleet had visited a remote and very dangerous region of the west, incurring dire troubles and loss, and bringing home very monstrous stories of their experiences. One may conjecture that its terrors were borrowed in some measure from the Arabs, repeatedly cited as above, who are known to have been very active in this part of the sea after their conquest of the Iberian peninsula, and who at some undefined date, considerably before 1154, had sent forth at least one expedition sworn to cross the Atlantic. Edrisi's account of their voyage relates their unsuccessful attempt to penetrate the Sargasso Sea, plainly indicated by Pizigani. Moreover, the man-stealing dragon is a cogent reminder of Sinbad's man-conveying roc. It accords with other evidence of interblending of Arab Irish legend that this island should have an Irish Gaelic name, though associated in words of explanatory inscription with the sea-Arabs and their adventures. The Bretons may have derived hints from both.

It is strange, no doubt, to find a single name shared by two islands of diametrically opposite repute: for there seems often some association of evil and danger with the Crescent Island, whatever its name on a particular map may be; whereas the ideal of Brazil was always gracious, no less than grand, it being still, in the minds of the Irish peasantry, more or less touched with lingering memories of the blessed islands of their old mythology. The map of Fra Mauro, 1459, counted especially wise and authoritative, names it Berzil, and identifies it with the Fortunate Islands. The suggestion of the maps appears to be that Irish mariners, probably from Limerick or near it, had found a land which pleased them by sailing south or west; and again, on this or some later occasion, had found a second region more remote in the same general direction, which they reported as a land of terror—the former being habitually presented in the latitude of the Blaskets (Braschia), the latter nearly in that of the

Isles de Sein, Brittany. This suggestion of possible prior discovery from the north-east of course does not at all refute the Breton expedition due westward, to which the Pizigani map bears explicit witness.

On the face of the matter it seems unlikely that either set of Celtic navigators would apply the same name to two radically different islands, especially as later cartography indicates that they would be slow to recognise them as belonging to one continuous coast. For not only were Labrador and Florida made islands on some early sixteenth-century maps, but sometimes the whole of the New World above South America was shown as an archipelago. It is true that Juan de La Cosa in 1500 and Ruysch in 1508 presented a continental coast-line where maps now show North America, but they were in the minority. Granting, however, that the Irish or Breton discoverers would consider the second land an island like the first, it certainly does not at all follow that they would make the first island share its name with the second. We may more reasonably assume that a different name was given, but was unknown to or forgotten by the Pizigani who made one word do double duty.

But "Brazir" did not adhere long to the Crescent Island. The very next map that we have, the remarkable Catalan Atlas of 1375, supplies a more successful form in Mam (Man), very likely the correct and original one, which, significantly, is Celtic also. From times beyond history Man had been a notable island between Britain and Hibernia. Mananan in the oldest part of the ancient *Voyage of Bran* chants his song as a sea-god encountered in his chariot above the waves. Mona, chief western seat of the British Druids—now Anglesea in North Wales—hardly varied the name. There was as good reason for applying it to one Atlantic discovery as there had been for applying the equally ancient and equally mythical Brazil to another. It is true that the Catalan map spells the word "Mam," but the final *m* and *n* were interchangeable, as Pareto clearly shows in his fine map of 1455, which unmistakably offers us "Arago*m*," "ha*n*c," and "Ca*n*aria," for Aragon, hanc, and Canaria. Moreover, we find the name plainly given as Man in the neat early fifteenth-century Venetian map attributed to Zuan da Napoli.

The Catalan Atlas is obviously quite independent of the Pizigani work and information, at least as much so as the latter is of the *Atlante Mediceo*. The first-named is very remarkable for a peculiar development of Brazil, the interior of which had merely been shown as rather cloudy by Dulcert: for on the Catalan map it becomes a circular sheet of water surrounded by a ring of land and dotted with islands. Of course there is a meaning in this, perhaps the key to a notable geographic mystery. It was naturally repeated by divers later map-makers.

Man also is treated boldly and confidently by the Catalan, being much larger in proportion to Brazil than in the Pizigani map, also much nearer to European waters, and for the first time shown in its fully settled form of a broad crescent or disc-section with the western indentations reduced to regular scollops. This does not necessarily indicate any great antiquity in the tradition, for the mind of that age tended to artificial island-forms, as we see in many instances, and no great time seems to have been needed for establishing one of these. But at least Man in

1375, like Brazil in 1325, had become a recognised part of geography, and was regarded as a region barely less in extent. Also the cautious tendency to reduce western distances and draw islands towards Europe on the map was still at work.

The name Man had to compete almost at once with another. Though Soleri's map of about 1385 shows both the circular and crescent islands without names (not far from their places in the Catalan Atlas of 1375), the Pinelli map, 1384, almost identical in date, and an anonymous map of about the same period, concur in naming this island Jonzele.[1] Possibly the name should read I. Onzele. Onza, in Italian, has for one of its meanings a section of a house or ship. In these maps the island is unusually small, a mere shred, curved but little, and not very unlike a longitudinal section of a ship's hull in miniature. Isola Onzele may conceivably refer to this, meaning the half-ship-shaped island. If so, it is the only one of Man's rather numerous names which seems to take account of its distinctive shape. Whether the conjecture be wholly satisfactory or not, there seems to be no other. A parallel instance is found in Tammar, so given in many works as it was formerly misread, but since discerned to be I. in Mar (Island in the Sea), and thus published in the fine copy of Beccaria's map of 1435, issued with Professor Magnaghi's monograph on the same by the Italian Geographical Congress of 1875, under the auspices of the Italian Government. The running of the words together as one is rather common.

These two maps, unlike all other early ones, agree in bringing the islands together as a close pair near the latitude of Ushant in Northern Brittany, and not very far south of Ireland; the little crescent in each instance being north-east of its neighbour and turning its hollow the same way, both peculiarities the reverse of the established rule. In other respects these maps differ, notably in the form of Brazil; their divergences and their agreements, so soon after the entry of the Crescent Island into cartography, constitute one of the most insoluble minor problems of our inquiry. Apparently the cartographers were surest of two facts concerning Jonzele—that it had nearly the shape above mentioned, and that it lay in the latitude of Brittany. Their variants of one version of the geographic facts might be derived from two slightly differing narratives of one voyage, or two differing copies of one narrative.

That version was merely episodical, however. Neither the name nor any of the special features of delineation appeared again in maps, but the Man (Mam) of the Catalan's ideal of 1375 reappeared early in the fifteenth century and held its ground for a hundred years. This is true of the shape and general style of the island, though the area and position vary more or less from type in exceptional cases; true also of the name, except that in some instances it is omitted, perhaps as unnecessary, or rarely changed a little. There is a general and rather close uniformity concerning it in the map of Zuan da Napoli, early fifteenth century, the anonymous Weimar map sometimes credited to 1424 and sometimes to 1481, the fifteenth-century Catalan map republished in Fischer's *Samm-*

[1] Fischer, *Sammlung*, vii. pl. 3 and 4.

luna, and the Italian and Catalan maps of Giraldi, 1426 : Beccaria, 1426 and 1435 : Bianco, 1436 and 1448 ; Benincasa, 1467 and 1482 : Roselli, 1468 : and Conde Freducci, 1497. Indeed, very few maps of the Atlantic prepared in that century were without this Crescent Island located and named as above stated.

A doubtful use of the name in that part of the ocean occurs two centuries earlier. A nearly elliptical world-map of the thirteenth century, copied by Santorem, indicates the Straits of Gibraltar by a gap in outline, which defines the position, as off Europe or off Africa, of the different oceanic islands, they being curiously represented by names in series following the curvature of the coast, though not drawn in any way. The continental names help us to place them, still rather uncertainly. The island names are parallel to the coast, and usually two deep, *e.g.* Thule and Dacie—perhaps Norway and Denmark —well at the top. Next above the straits we find the only instance of names three deep, apparently the three groups of the Azores. Next above these we have Man and Icoas, the former outside, the latter inside. Next above them are Roignegia and Ircadia : the next pair still is Bputlandia and Islandia, looking like a rather bad guess at a blurred Brittany and Ireland. Ircadia may possibly be the Orkneys. Beyond that it is rather wild guessing. Man and its partner are nearly opposite Flandria and Belgica. The first name, of course, may simply mean the island between Great Britain and Ireland : it is most unnaturally placed for this—but then on any theory the names have been shuffled about recklessly. Its position no doubt suits rather better the Crescent Island, far south-west of Ireland. Its companion Icoas must be something obsolete or a sad case of misreading and deformation. The initial letter may stand for island as usual. Coas is rather less unlike the separated middle part corus or colus of Pizigani's alternative name for Brazil (probably Montorius, as first written or uttered) than the name of any European island or shore which can be suggested. Such an explanation would bring the two insular regions Man and Brazil together at this early date, as was usual afterward ; but it leans on too slender support.[1] We can only say, on the authority of this map, that the name appeared in the Atlantic in the thirteenth century.

The word "Man" in Gaelic is said to have once meant "hand." It is at any rate identical with the first syllable of the Latin *manus*, and very much like the Portuguese derivative Mao, which has the same meaning. Bianco's chief innovation in nomenclature in 1436 was to change the name of the great rectangular island Saluaga or Salvagio, far west of the Azores and opposite Gascony and northern Spain, to La Man (or Mao) de Satanaxio. This has been commonly, no doubt correctly, understood as "The Hand of Satan," explained by a monstrous Oriental legend.

[1] Lelewel, in his *Géographie du Moyen Age*, Atlas, presents the same map, with a different reading of the names. The one next to Man is made Scona. The two next above them are Norwegia and Islandia : three next below Anglia, Wallia, and Ibernia. Perhaps his fancy may have been at work, as in applying the island names in the Edrisi restorations of his text maps. Yet he may be right in thinking *this* Man the one best known.

That island constitutes the second in size, and the most northern but one in position, of the conspicuous group of four large islands which Beccaria labels "Insulle de Novo Rep'te"—Recently Reported Islands. Of course there is nothing in its form or size or location to connect it with the Crescent Island; but the word Man has sufficed to make them pass for the same, at least conjecturally, with divers well-known writers. Yet the fact that Bianco himself shows both of the islands on one map with their characteristic forms, positions, and sizes, and in widely different parts of the ocean, ought surely to suffice as refutation. Evidently he had no fancy that any one would ever think of confounding them in any way.

The sixteenth-century cartographers for some reason preferred in most instances the equally curious name Mayda, which had many variants, as Mayde, Mayd, Maidas, Las Maydas, Asmaidas, Asmaida, and Asmandas. Asmaida was perhaps the first to appear—in the Ptolemy-Ausgabe map of 1513. Humboldt[1] seems to derive Asmaida from an Arabic word of diabolical meaning, and thinks a suggestion of the latter character came from the supposedly infernal fires of volcanic islands farther southward. But this same map of 1513 turns Madera to Amadera, Gomera to Agomera, and Brazil or Brasill to O'Brassil. If these initial letters be not substitutes for the familiar I or Y, they seem to prove a fancy for meaningless prefixes of no more significance in the case of Mayda than any other. The name may be Arabic, but surely there is no more likelihood of that because the syllable "As" gives it an Arabic form.[2] Bentusle, applied by Andreas Bianco to this island in 1448, has also been thought Arabic, presumably on account of the Semitic Ben: but it could be accounted for quite plausibly as a variant of *ventus*, with much the same meaning as Forteventura, being rendered "the windy island" on this Latin-derived basis.

However derived, Mayda is remarkable for its success in permanently supplanting, with rare exceptions, the long-established Celtic name. It is true that the maps of Ruysch, 1508, Thorne, 1527, Bordone and Coppo, 1528, and Ribero, 1529, do not show the island, but nearly all which do so call it Mayda. It is also true that the 1513 map above mentioned departs from the crescent form and shifts it southward a degree or two, though leaving the identification in other respects clear enough: but this was soon remedied. For example, in a Portuguese map of 1519 or 1520, reproduced by Kretschmer, which makes it crescent again in form, and moves it back to the forty-eighth parallel of North latitude.

Another Portuguese map, reproduced by Fischer, which curiously parallels in some important respects the Bianco map of 1448, and must be of the same period, reverts to "Mam," and slightly varies the inclination of the crescent, though otherwise regular and old-fashioned in its representation.

A more remarkable exception occurs in the American "Man" of Nicolas Nicolay, 1560. He puts "I Man or Bolunda" at the Straits of

[1] *Exam. Crit.*, vol. ii. pp. 241 and 245.

[2] *Exam. Crit.*, vol. ii. p. 231.

Belle Isle above Verde, which seems to be a part of disintegrated Newfoundland, Brazil being a little farther out, perhaps in the western border of the Great Banks. Zaltieri of 1566 nearly repeats this position, though his islands are a little farther from the straits, and he uses Mayda, not Man, as a name. Ramusio, 1566, enlarged Maida to exceed Brazil in size, setting it well out at sea, but Gastoldi, illustrating Ramusio's text, about 1550 planted an *isola de moni* on the very site of Nicolay's really crescent Man, and very funnily illustrated the little demons there in wait and at play, as may be well seen in Justin Winsor's *From Cartier to Frontenac*. He also shared the common fancy of a broken-up Newfoundland, though his Island of Demons is a very large fragment. The "man" and "moni" of the latter two maps may have some connection beyond coincidence. Bolunda seems more like some native name. But the crescent form of the fourteenth and fifteenth centuries, the name appropriate thereto in the former, and the evil associations symbolised in Pizigani's monsters and hazy references to Arabic tales have all crossed the ocean to American waters. Humboldt noted this, but perhaps laid too much stress on volcanic fires and too little on the storm voices of upper Newfoundland, its sea-beaten cliffs, and ice ground wildly on the rocks. It is at least possible that distorted rumours of far western dangers and elemental complainings had first been carried to Europe, and afterward, in their island embodiment, shifted back to their place of origin, as men came to know that the sea really had a continental limit in that direction and where that limit lay.

But at this time another influence was at work, which soon relegated Mayda, like Brazil, to the yet unfamiliar waters of the middle ocean: for men were travelling up and down the American shore and growing sceptical of islands and wonders which they did not readily find —a mental condition promptly reflected on the maps. Thus Descelliers, drawing for Henry II. of France a very museum of strange sea-islands, some of which may be set down to sheer fancy-play under royal stimulation, had established Maida in latitude 53° and a more eastern longitude than St. Michael: and Prunes, 1553, calling it Illa d'Mayd, had offered a neat instance of the accepted representation of the Crescent Island as to form and size, though less bulky than in some maps, and planted it in more southern waters than Descelliers, opposite Brittany, in mid-ocean, latitude 48°. Mercator, 1569 and 1587,[1] and Ortelius, 1570,[2] beside their later issues, also kept the island remote from either shore, but gave it sometimes the surprising Flemish name Vlaanderen, which did not last on the maps, but had practically disappeared by 1600.

"Mayda" kept on through the centuries, always avoiding the greatly frequented shore-waters of both continents, usually accompanied by the crescent outline in diminished area, and merely exhibited more infrequently as scepticism grew. As instances, one may cite the As Maydas of F. de Witte, 1660, in about the longitude of Madeira,

[1] Nordenskjöld, *Facsimile Atlas*, plate xlvii.

[2] Schott, G., *Geography of the Atlantic Ocean*, p. 6, map.

latitude of Brittany and Avalon Peninsula, Newfoundland: a French map of 1771 showing Maida in latitude of Gascony, longitude of Palma in the Western Canaries; a Chart of Currents by Findlay, 1853,[1] and a Relief Map of the World, first issued by the Central School Supply House, Chicago, in 1892 (latest U.S. copyright, 1906), which shows Mayda, thus named, about in the latitude of the mouth of the Loire and the longitude of Iceland. Negra's Rock and Jacket I. are also shown; but not Brazil (Island or Rock), nor even the undoubtedly real Rockall.

Negra's Rock, it may be said in passing, was reported by a skipper of that name near the end of the eighteenth century, according to a publication in the U.S. Hydrographic Office, but later investigations have not confirmed him, and the name represents nothing real—not even any really historic error.

Perhaps the ancient and evil reputation of the Crescent Island—which began its career in the company of dragons and other uncanny monsters, and two centuries later was still the playground of devils on the shore of the Straits of Belle Isle—may more or less account for Devil Rock, which appears in its stead on some moderately recent maps and in divers sea-captains' reports apparently given in good faith. The Hydrographic Office has kindly supplied a few of these. Thus it appears that in 1737 Captain Brignon of the *Constance* placed it in latitude 46° 55′ N. about 110 leagues WSW. of Ushant. It was again observed, in 1764, by Captain Thomas of Havre de Grace, as a rock three feet above water and forty feet in diameter, of a grey colour covered with moss, latitude 46° 24′ N. and longitude 13° 10′ W. In 1818 Captain Peter of the *Boothrock* reported it as of the same size in 46° 35′ N. and 13° 7′ W. The sea broke over it. It was also reported by Captain Henderson of the *Fortescue*, in 1809, as twelve feet in diameter and two above water, by Captain Livingston of *The Friends* as a shoal in 1820, by Captain Swamson of the *Fortitude* in 1829, by Lieutenant Sprigg of H.M.S. *Brisk* in 1842. But repeated soundings of governmental vessels have shown very deep water at divers points in the region where it is supposed to be, and the official conjecture is that the observers in question were misled by appearances on the surface of the sea.

Whether or not the possibility of a peak jutting up to the surface, like the Matterhorn from a very small base, is wholly eliminated must be left to the judgment of navigators. But, so far as the matter has been investigated, Devil's Rock seems to be a creation of seamen's fancy, prepared for in advance by the charts and maps showing Maida, and by dim lingering impressions of the perils attending the Crescent Isle, however named.

But it is not easy to believe the island itself—so constant in form and latitude, so variously named at different periods in different languages, so conspicuously and emphatically associated with at least

[1] Westropp, *Brazil*, etc. (cited), p. 246. Humboldt, *Exam. Crit.*, vol. vii. p. 163, citing Purdy.

one definite expedition—to be wholly a product of fancy. If it be real it cannot be European, even in the sense of the remotest outpost, and there is nothing beyond this until you reach America. By turning more to the southward (as some of the maps of the fourteenth and fifteenth centuries make the slant from Brazil) we might admit the Bermudas to consideration, but they have always been counted American, though well offshore.

Their reputation in Shakespeare's time as the "still vexed Bermoothes," infested by Calibans and dangerous magic, seems to point that way. Also the crescent form is given to the main Bermuda island in the maps of Mercator, 1569, De Witte, 1660, and an undated French map, having 1669 for its latest discovery entry—perhaps it was made about 1700. But neither the evil reputation nor the artificial form was the absolute monopoly of any island, as witness Inferno, which we now call Teneriffe, the Isle of the Dragon and the Isle of the Hand of Satan. Again, the crescent outline is occasionally given to Madeira, that most "fortunate island," sometimes to one of the Canaries, and always to Insula in Mar. The latitude seems low, yet need not be conclusive against it.

One difficulty is in guessing how much to allow southward from the 48th degree, on which we most often find the Man or Mayda of the older maps. If we cut this down to about 42 we shall hit Cape Cod, a great sickle form protuberance of nearly insular land, which presents its concavity westward, and the outer corner of which has a bad name for hardships, dangers, and wrecks. These evils may once have been worse. Manifestly it fulfils many of the conditions imposed, and it is not possible to find a mainland stretch of coast north of Cape Hatteras that would do nearly so well.

Thus if Mayda be American, it seems most likely to be Cape Cod or Bermuda, with a slight preference for the former. Since some representatives of the Phœnician peoples appear to have reached Corvo, presumably passing beyond: since the Irish of the early centuries of conversion undoubtedly reached Iceland and sailed farther still; since the Arabs apparently made the acquaintance of most of the eastern Atlantic islands, if they passed no farther, and since the Norsemen coasted the shore of mainland America and tried to settle there, it does not seem hard to believe that other maritime visitors from Europe, at various early times, may have reached some projecting points of the new world, which they regarded and named as islands, one of these being Man or Mayda.

That it successively bears the names of Celtic, Arabic, Italian and Flemish origin does not necessarily indicate a series of discoveries by different nations; but Pizigani's map is explicit as to a visit from Brittany. It is such a report as might be brought back by the adventurous Breton fishing fleet from its extreme far-western ranging among dangers. Persistent pushing might carry some of its members to Cape Cod or Bermuda, or storms might drive them there in disaster. This seems more likely than entire invention of the tale which the Pizigani flags, ships, monsters and inscriptions have put on record.

GEOGRAPHY IN SCHOOLS: A REPLY.

By B. C. Wallis.

I should like to preface this reply to the review of my book, *The Teaching of Geography*, by Mr. G. G. Chisholm [1] by thanking the editor for the courteous invitation to make this reply, and by acknowledging the sympathetic spirit in which Mr. Chisholm makes his comments. A book on the teaching of geography may be criticised from the three following points of view: *firstly*, that of the practical teacher who asks for guidance in teaching geography; *secondly*, that of the expert geographer, who examines what may be called the geographical content of the book: and, *thirdly*, that of the scientist, who is on the lookout for contributions to the theory of geography regarded as a science. Mr. Chisholm writes from all these points of view, and his remarks may be taken in the order which has been set out above.

From the practical point of view Mr. Chisholm lays stress upon my omission to give suggestions on the teaching of *hachures* (p. 411), and upon the inclusion of map-reading tests from printed copies of portions of Ordnance Survey maps in examination papers. In my experience, the difficulty of hachures never arises, the principles of hachuring require no teaching, the pupils who work through the course use hill-shading naturally when they need that vehicle of expression. It is not possible to draw a sketch, such as fig. 10 in my book, from a contour map without appreciating the points which hachures illustrate. To them, hachures need no emphasis, the examination of a model of North Wales, made by their school-fellows, and the simultaneous examination of an Ordnance map, such as fig. 39 in my *Junior Geography of the World*, is sufficient. Mr. Chisholm's experience regarding the use of portions of Ordnance maps in examinations simply justifies my implied criticism; one examiner may do very little, but many examiners, by creating a demand for such maps, will soon bring into existence arrangements for adequate supplies. I fancy the matter could be managed much more cheaply than Mr. Chisholm found.

From the point of view of the content of school geography, I made, deliberately, frequent reference to the question of mineral deposits. In atlases, map-makers indicate, usually by blobs of colour, the presence *in situ* of certain ores. Presumably they rely upon the investigations of field geologists. Text-books sometimes state loosely, "mineral A is found in the neighbourhood." The pupil gleans nothing more from these helps than the knowledge that the mineral occurs there; he does not know whether it is worked, whether it is likely to be worked, or whether it may never be worked. Geography is related to human activity, yet the pupil is not told now this deposit is related to men's efforts. Some improvement is required, and I suggest that the school pupil should not be told of the presence of mineral

[1] *Scottish Geographical Magazine*, August 1915, pp. 406-411.

deposits unless there are miners actually at work at the place. Mr. Chisholm's remarks about the potential value of unworked deposits are excellent for the student of geography who has passed beyond school years. Pupils in school should rarely learn facts in isolation, and, since they know no geology, facts regarding unworked minerals are isolated facts. This is the theoretical objection, but there are potent practical objections to be added; firstly, the facts of school geography are too numerous, and it is time that an effort should be made to eliminate the comparatively unimportant facts: secondly, the method of presentation of the facts is loose, and helps the pupils to think loosely; thirdly, the principle of relative importance should be applied to the graduation of the facts to be learnt concerning the world's minerals: it is important to know a great deal, for example, about the iron deposits in the United Kingdom, since there are many iron-workers among our people; it is less important to know so much about the iron ores of Canada, for there are fewer workers in iron; it is of no importance to the child to know about the iron deposits in South Island, New Zealand, since no one works them. The actual or potential value of mineral deposits depends not only upon the factor of situation, but upon the factors of transport, distance from markets, facilities for mining, etc., and it seems to me absurd to exaggerate the importance of one factor to the exclusion of the others. Mr. Chisholm's experience, as an examiner, no doubt agrees with mine; candidates are apt to infer, because a mineral is stated to exist in a locality, that this mineral is an important element in the life of man in the locality; he has, no doubt, found cases where the only knowledge possessed by a candidate regarding a certain district is a knowledge of the presence of unworked mineral deposits and a complete ignorance of the essential facts concerning the real occupations of the people of the district.

I dwell upon this matter at some length, in the hope that it will give rise to the expression of opinions from teachers and others, and in the hope that the columns of the *Scottish Geographical Magazine* will be open for a discussion on this point. Mr. Chisholm refers (p. 409) to my remarks upon the acquisition of topographical knowledge. My experience differs from his; it is still necessary to state that mere drill in the names of capes and bays, etc., is not essentially geographical; a knowledge of the names of the chief capes of the world does not mean that the pupil has acquired some knowledge of geography. Mr. Chisholm refers to my remarks in the concluding chapter, which is a summary of the book, but he seems to have missed the more complete reference to topography in the first chapter, which deals with the scope of school geography.

A teacher's presentation of the matter of his special subject will depend upon his views regarding what may be called the "logic" of the subject as a branch of knowledge. His teaching will be influenced by his pedagogical and also by his scientific outlook; but neither in his actual lessons nor in his description of his teaching will his views upon the theory of teaching or the theory of knowledge find explicit statement; hence Mr. Chisholm, like others who examine a book upon teaching from

the third point of view stated above, is at a slight disadvantage in that he tries to make explicit what is necessarily implicit. My views on the fundamental bases of geography as a science are not set out with precision and care of statement in my book, they underlie my practice and they are implicit in my description of my teaching, but they cannot be regarded as a studied contribution to the theory of the science of geography. Mr. Chisholm, however, lays greatest stress upon this aspect of my book: he says that my descriptive statement of the subject-matter of geography would apply to a large part of medical science. This is so, and some day a geographer will write a geography of medicine; not only medical science but medical practice is limited by its environment, else why should American practitioners, for example, find it useful to visit Europe and compare notes with their co-workers. "The environment in which human life is passed" is not limited to the place-element, the time-element is of almost equal importance, and, perhaps, the human-element is most important of all. Human caprice, human folly and human ambition are environmental influences which the rigid geography of earlier days tended to ignore. School geography is, so far, almost entirely devoted to the element of place, so that I could do little more than suggest other ideas.

Mr. Chisholm next deals with my generalisations. He appears to limit his view of a generalisation to the ideas of cause and consequence; these ideas are to a large degree inapplicable in geography, where a generalisation partakes of the nature of a statement of co-existence of certain related factors: in geography there are more interactions than reactions. My view of the term generalisation is based upon Dr. Venn's *The Principles of Empirical or Inductive Logic*. Referring to the statements that "essential similarities are presented by the winter rain regions wherever they occur" and "monsoon rains are limited to the same area as the tropical temperatures," Mr. Chisholm asks: "What is the essential similarity between the winter rain regions of Sicily, the south-west of British Columbia, the south-east and the extreme north-west of India, and the western seaboard of Japan, and what more typical monsoon area is there than northern China, which surely cannot be described as having tropical temperatures!" In reply reference may be made to Dr. Herbertson's maps of *The Natural Regions of the World*, where the classification of the world into definite regions is surely based upon essential similarities, and where the south-west of British Columbia is *not* given as a region of winter rain and where northern China is *not* given as a monsoon region, and also where the monsoon regions are a sub-division of "The Hot Lands."

It may be that Mr. Chisholm would not accept Dr. Herbertson's precise interpretation of the terms "winter rains" and "monsoons," yet this would scarcely affect my position, which depends upon the acknowledged utility of the regional treatment of geography. I specifically state that similar winter rain regions are not identical, and it seems to me to be a contradiction in terms to speak of temperate monsoon rains.

Finally, there are several other matters to which Mr. Chisholm

refers. Having met teachers who are interested in the controversies connected with the formation of coast-fiord lines, and others who use block diagrams in their teaching, I refer to these facts and point out that the teacher, as a student, may be interested in controversies which are not fit studies for his pupils, and in the second case, that block diagrams of river capture—to take an example of their use—should follow, if used at all, the study of models of definite areas of the country. I do not say that the study of block diagrams to show the processes of river capture is necessary: I refer to a growing practice of using such diagrams, and suggest that the model should come first, a practice which is not usually adopted.

Similarly, with reference to the Hudson Valley, Mr. Chisholm emphasises what he considers my lack of explanation of the present importance of this topographical feature. My reference to the Hudson Valley occurs in a chapter concerned with the relations between history and geography, and I deliberately chose this valley as an illustration of the point that no matter what value is, or can be, attached to its present importance, that importance is not relatively so great as the importance of the valley during previous centuries. Put baldly, the argument is this: let the present value be X, then the value in past years was more than X. Surely such an illustration was not the place for an exposition of the factors which contribute to the present importance of the Hudson-Mohawk traffic line, no matter how great, or even if such were the case, how small, the present importance may be. The deliberate choice of the Hudson Valley might be presumed to emphasise the point that man's progress has reduced the relative importance of topographical features, since he is ever engaged in the attempt to minimise their relative importance. Briefly put, the opening of every new route across the Appalachians has reduced the relative importance of the Hudson Valley, which was at one time the only route westwards.

Again Mr. Chisholm quotes part of a paragraph: "the element which introduces order into the treatment of town life is largely the question of the uses to which the coal deposits have been put," and says that this quotation is based upon too limited a view, the consideration almost solely of the British Isles and certain parts of Germany, to the exclusion of the United States, and omits to quote the remainder of the paragraph which goes on immediately: "and hence the British Isles can be conveniently treated in reference to the industries which have arisen upon the coalfields," and fails to state that the paragraph from which the quotation is taken is headed "The British Isles." With so many signs that attention is concentrated upon the British Isles, it does not appear to me that the reader should extend his thought beyond the limits of these islands. The implication of the paragraph was intended to cover the well-known teaching practice of concentrating the treatment of British towns on those populous centres which lie upon the coalfields. This practice is familiar to me through twenty years' experience of teaching in schools.

[NOTE.—As several of the points discussed in the above article seem of practical

importance in the teaching of geography, further discussion from teachers and others would be welcomed. The points upon which it seems attention might be usefully directed are especially the following: The extent to which unexploited mineral deposits should be considered by the teacher in an ordinary school course, and especially the value of the late Dr. Herbertson's division of the world into *Natural Regions*, notably of his somewhat exceptional use of the term monsoon. This use, accepted by Mr. Wallis, does not seem to be that of most authorities. Ed. *S.G.M.*]

GEOGRAPHICAL NOTES.

Asia.

Exploration of Siberian Coast.—In reference to our note on this subject which appears on p. 207, it is announced in the daily press that both the Sverdrup and Vilkitski expeditions have returned safely to Europe. The two parties in their three ships reached Archangel in the middle of September. Commander Vilkitski has been successful in making the continuous voyage from Vladivostok to Archangel along the northern coast of Siberia, and this without the loss of any member of his crew. No details are as yet available in regard to Captain Sverdrup's expedition, beyond the fact of the safe arrival of the *Eclipse*, the ship of the expedition, at Archangel.

Africa.

The German Colonies in Africa.—M. Gustave Regelsperger contributes to the *Revue Général des Sciences* for June 15 an article on the German Colonial Empire as it existed before the outbreak of the war, and on the probable future lines of development of its component parts. The most interesting parts of the article relate to the African colonies, which are the most extensive, and it is this section which we shall summarise here.

Beginning with the western colonies, we find that Togo is a narrow strip of territory extending from the coast to about 11° N. lat., compressed between French and British lands. As regards productions and fertility this strip of land falls into various zones. Nearest the sea is a belt of sand and narrow lagoons, behind which lies a vast undulating plain, with a tropical climate and heavy rainfall, rich in forest, and fitted for the cultivation of coconut trees, oil-palms, cotton, and so forth, while the natives grow also a variety of cereals and vegetables. This coastal savana is separated from an inland mountain belt by an arid steppe. The mountain chains run from north-east to south-west, and rise to heights of about 2250 to 2500 feet. The rains are heavy, and as the soil is generally more or less impermeable there are many rivers and springs. A considerable amount of forest occurs, and cocoa, coffee, and rubber vines can all be grown. The great resource of the regions is, however, livestock rearing, hitherto carried on only by the natives. The industry is capable of considerable development, but is greatly

handicapped by the fact that the cattle cannot be brought down to the coast owing to the existence of tsetse-flies there. The whole commerce of the country suffers also from the absence of good natural waterways, for only a part of the course of the Volta lies in German land. The products of the north, also, tend to leave German territory to reach the great waterway of the Niger. The union of the colony with neighbouring territories would greatly increase its chances of development. The Kamerun is somewhat more favourably situated as regards natural outlets, but as yet it is chiefly the tropical forest of the coastal belt which has been exploited. Thus the most notable items in the list of exports (nearly £2,700,000 in 1912-13) are wild rubber (to the value of £575,000 in 1912-13), and the products of the oil-palm, while ivory is also important. Efforts are however being made to extend cultivation, especially that of cocoa, which was exported in 1912-13 to the value of over £200,000. Rubber, oil-palms, coffee, tobacco are also being planted, but the natives show no desire to engage in cultivation, and labour is difficult to obtain. In the whole extensive colony there are not more than 1500 Europeans. In German South-West Africa, now in British occupation, conditions are different. The cold coastal current reduces the mean annual temperature, and the region belongs rather to south than to tropical Africa, despite its position. In consequence there has been a considerable emigration of Europeans, who number 15,000 persons. The colony extends over an area equal to one and a half times that of Germany, and yet the total native population is well under 90,000, and the relations between the governing power and the governed have not been happy. The great difficulty is of course the lack of water, and though the inland plateau region seems to be suitable for cattle-rearing it is difficult of access from the coast, which is fringed by an inhospitable desert. In the north, in Amboland, sugar-cane, cotton and tobacco have been planted but not on a large scale, and cattle, sheep, horses, mules, pigs and ostriches are reared. The mineral wealth appears to be considerable, diamonds occurring all along the coastal belt, and furnishing the greater part of the resources of the colony.

German East Africa is the largest of the German African possessions, and is of very varied surface and climate. It is estimated that about one-sixth part of its surface can be utilised. In the coastal belt cultivation has made considerable progress. Here coffee plantations were first started, and later rubber, vanilla, coco-palms, cotton, and sisal hemp have all been planted. Until recently the absence of suitable lines of communication has been a great drawback, but, some months before the outbreak of the war, the line from Dar-es-Salaam to Lake Tanganyika was completed (cf. this *Magazine*, vol. xxx. p. 144), and high hopes were entertained in Germany of its probable effects on the development of the colony. Another short line runs inland from Tanga, in the north, to the base of Kilima Njaro, a region undergoing a considerable amount of development.

Projected Scientific Institute in French Tropical Africa.—In the *Revue Générale des Sciences* for July 30 there appears an article by

Professor Emile Perrot embodying a scheme for the establishment on the Ivory Coast of an institute to be devoted to scientific agriculture in the largest sense. Such technological institutes should, Prof. Perrot thinks, be established in connection with all three groups of French colonies, that is in West Africa, Madagascar and Indo-China, but the special object is to suggest a site for such an institution in French West Africa. The paper is illustrated by two interesting sketch-maps, in which it is shown that the coast of the Ivory Coast colony has no less than three maritime capitals, all situated on the lagoon, within a few hours by steamboat from each other. These are Grand Bassam, the port; Bingerville, the administrative capital; Abidjan, the coastal terminus of the railway which leads into the interior. The existence of three centres so near together in such a region is a somewhat remarkable circumstance, and is not likely to be permanent. The administrative capital of Bingerville was founded on an airy hillock because Grand Bassam was a nidus of malaria, but with the disappearance of the mosquitoes fever is also disappearing, and the port, formerly difficult of access, is being improved. Abidjan was selected as the head of the railway line, because behind it the forest belt is specially narrow. It seems destined to become the commercial capital of the whole region. Thus in all probability it will become necessary to transfer the seat of government there, and M. Perrot's suggestion is that the present administrative buildings at Bingerville should be converted into a scientific institute. For such a purpose the site seems well chosen. In the first place the scientific botanist will have within easy reach the very remarkable vegetation of the lagoon, which passes with scarcely any transition into the great West African forest belt. Further, since, as already mentioned, the forest belt is unusually narrow here, the savana and scrub country beyond can be reached after a short journey. Similarly the student of tropical agriculture will find in the vicinity full scope for his energies, as will also the economic botanist, for the forest is rich in rubber plants, oil palms and so forth. The lagoon fishery, still carried on by primitive methods, demands scientific guidance, while there are great possibilities in the direction of cattle-rearing. Finally, the health conditions are good, and there is a regular service of boats from Bordeaux. These boats take thirteen days for the journey, so that investigators with three months to spare could spend two of these in the colony. M. Perrot puts forward his proposals as a part of a scheme for the application of scientific method to the development of tropical colonies. One result of the war has been, he considers, to open the eyes of the French people to the need of a further application of scientific method to the needs of agriculture and industry.

Palæolithic Man in South Africa.—Mr. F. W. Fitzsimons, of Port Elizabeth Museum, contributes to *Nature* of August 5 an illustrated letter on some fossil human remains found at Boskop, in the Transvaal. The remains include a skull-cap and some skull fragments, and from the characters of the former, Mr. Fitzsimons believes that the human being represented belonged to the Neandertal race. This is doubted by

Professor Arthur Keith in a note appended to the letter, but, whatever the particular race, there is no doubt that the remains prove the existence of Palæolithic man in South Africa. This is of great interest owing to the wide distribution of unpolished stone implements over South Africa, these implements being so numerous as to suggest that if they are all the work of the newly discovered race, that race must have been numerously represented. A report upon the finds is to appear in the *Journal* of the South African Royal Society.

Polar.

Safety of Stefansson.—In the middle of September telegrams from Canada announced the safety of Mr. Stefansson, the Arctic explorer, who in some quarters had been given up for lost. During the period which elapsed between Mr. Stefansson's departure from the coast of Alaska in March 1914 and the date of his message from Herschel Island (August 1915), the explorer has not only carried on much sledging work on and around the islands of the great Arctic archipelago, but has also discovered new land to the north-east of Prince Patrick Island, the new land being presumably a continuation of the Arctic archipelago.

It will be remembered that when the *Karluk* went adrift in September 1913 (vol. xxx. p. 43), Stefansson, with a party, was on shore hunting. He thus did not share in the adventures of that ill-fated ship. In a long despatch, which appears in the *Daily Chronicle* for September 20, he states that after the loss of the boat he resolved to attempt to carry out his original scheme of exploration by sledge alone, and with this object in view left Martin Point, in about 143° W., towards the end of March 1914. The party at the outset consisted of seven men with sledges and dogs. Considerable difficulties were experienced, owing to the condition of the ice, and after various accidents and the sending back of a supporting party, the leader, with two companions, food for forty days, and the dogs and sledges, was left to continue the journey over the ice to Banks Island. Supplies rapidly diminished, but the party were successful in obtaining seals and bears, and on June 26 reached a point some thirty miles south of Cape Alfred, the north-west point of Banks Island. The summer was spent in the vicinity of Norway Island, whither Stefansson expected the ship *North Star*, which he had purchased, would come in search of them. Here many caribou were killed. As the ship did not appear by the end of August the party made its way southward to Cape Kellett, the south-westerly point of Banks Island. Here they found the motor boat *Mary Sachs* in winter quarters, and learnt that through some misunderstanding they had been given up as lost. During the winter Mr. Stefansson made a 400 mile trip to the south-east of Banks Island and Victoria Island, and at the beginning of February started on an ice trip northwards. After passing Cape Alfred the party proceeded along the west coast of Prince Patrick Island, and on June 15 reached the northernmost point of the island, and found there a record left by M'Clintock,

dated June 1853. A day or two later new land was sighted to the north-east. The coastline of this new land trends north-west, and only one sextant observation could be taken, which gave 77½° N. lat. and 115½° W. long. Some 100 miles of the coast were seen, and mountains were visible fifty miles further east, rising to a height of 2000 feet. Thus the new land seems to be extensive. It proved to be rich in game. On the return journey some small islands were discovered between Melville Island and the new land. The party followed the west coast of Melville Island southward, crossed to the Bay of Mercy in Banks Island, and finally traversed the island diagonally to Cape Kellett, which they reached on August 8. A few days later the schooner *Polar Bear* arrived. This vessel was chartered by Mr. Stefansson to bring supplies from Herschel Island, whence the despatch was sent off. At the time when it was despatched the explorer was about to return with the supplies to Banks Island, where he hoped to establish a more northerly base from which a start may be made next year for further exploration of the new land.

Commercial Geography.

The War and the Sugar Crop.—An article in the *Revue Général des Sciences* for May 30 summarises in an interesting fashion facts in regard to the sugar industry which have appeared in a trade journal. The effects of the war upon the industry have been manifold. Taking France in the first place, the fact that the outbreak of war coincided with the beet harvest meant difficulties in obtaining labour, owing to the mobilisation, difficulties in obtaining coal, in getting rid of the by-products, and so forth. Further, as the months went on the occupation by the Germans of a considerable part of the sugar-producing area of France led to a reduction in the number of factories. Thus in February of the present year only 69 establishments were in operation, as contrasted with 206 in the preceding year. The fate of the remaining factories is, as the article observes, quite uncertain. Some have been destroyed by the fire of the enemy; some have been occupied, their copper utensils seized for the manufacture of munitions, the supply of beets sent to Germany for cattle food. Finally, some have been working under enemy supervision. The net result is seen in the figures of French production. At the end of December 1913, this was 698,513 tons, at the end of December 1914 only 197,655 tons had been manufactured. This leaves an apparent deficit of more than 500,000 tons, but belated production in all probability reduced this figure. For Europe generally the deficit for the season 1914-15, as compared with the preceding, amounted to approximately 800,000 tons. This deficit was spread over most of the sugar-producing countries, but Austria (not Hungary), Holland, Sweden, Denmark and Russia produced somewhat more than in the previous period. For the world as a whole, the 1914-15 sugar crop was apparently diminished by less than 5 per cent. as compared with the preceding season. This reduced output will, in all probability, be more than counterbalanced by reduced consumption owing to the increased

price of the product. This increase is due to the rise in price of all the necessities of production, including labour and transport.

In France there is reason to believe that the production in the period 1915-16 will be further reduced, for owing to the difficulties of the labour supply only some three-quarters of the usual area can have been sown. Seed is usually obtained from Germany, but this year Russia furnished the whole of the necessary supply. It seems likely, the author observes in conclusion, that the sugar industry of France will feel the effects of the war for a prolonged period.

Silk Production in Bulgaria.—We noted here on p. 436 the fact that silkworm rearing is steadily diminishing in Italy. It is therefore of special interest to note that the industry seems, on the other hand, to be making progress in Bulgaria. Bulgaria, as a country of smallholders, is one which theoretically should be well suited to silk production, and further the warm and dry climate, especially towards the south, makes the cultivation of the mulberry easy. It will grow to heights of 3000 feet above sea-level, and the administration is making great efforts to increase the plantations, as well as to promote silkworm rearing in other ways. According to a note in the *Journal* of the Society of Arts for July 2, progress since 1908, when Bulgaria threw off the last vestige of Turkish authority, has been rapid. At that date mulberry plantations covered less than 4000 acres, but by 1912 this total had been almost doubled. As in other parts of the world the great difficulty is the acquisition of the care, patience, and rigorous cleanliness necessary for the production of good, clean cocoons, and the Government is doing its best to disseminate a knowledge of the necessary conditions for success. On the other hand silk-reeling in the country does not seem to have survived the last two wars.

Petroleum in Papua.—A short report in the *Bulletin* of the Imperial Institute (xiii. 2) gives some account of the discovery of petroleum deposits on the banks of the Vailala river in the Gulf Division of Papua. The oil deposits occur within 12 miles of the coast, and though the crude petroleum is apparently unsuitable for the production of a fuel oil for admiralty and marine use, it nevertheless seems to be a valuable type of oil. The Commonwealth Government is to undertake a systematic geological investigation of the field in order to ascertain whether it can be worked at a profit.

Traffic through the Panama Canal.—A correspondent of the *Manchester Guardian* discusses the results of the first year's working of this canal, as shown in the official reports. The fiscal year ended on June 30 last, and the canal was not opened for traffic till August 14, 1914, so that the period covered is one of 10½ months only, and that during a time of disturbed commerce. The official list gives 1088 vessels as having passed through the canal, and among the nationalities German and Austrian ships are not represented. The U.S.A. were represented by a total of 471 ships, while 464 were entered as British. No other

nationality reached a total of 50 ships, the third on the list being Norway with 41, Chili following with 35. In other words, of the vessels classified 43·3 per cent. were American, 42·6 British, and the remaining 14·1 per cent. were distributed among thirteen other nationalities. But of the 471 vessels sailing under the stars and stripes no less than 335 were engaged in coastwise trade, that is trade between the eastern and western seaboards of the States, which can only be carried on by American vessels. Thus of the total number engaged in oversea trade 61·6 were British. The total amount of cargo carried was about 5,000,000 tons, and the revenue earned was about 4½ million dollars.

Railway Development in South-West Africa.—Prior to the present war there was no railway connection between what was then German South-West Africa and the Union of South Africa. In connection with General Botha's campaign it was decided by the Union Government to link up the two systems, and a beginning was made in September 1914. Before the war the German line from Lüderitz Bay extended to Kalkfontein, about 80 miles west of the Union frontier. The nearest point on the Union system of railways was Prieska, on the south bank of the Orange, served by a branch from De Aar. The new line starts from Prieska, and is continued parallel to the Orange till that river is crossed at Upington. Thence the new line runs north-west to Nakob, near the old international frontier, and then west to Kalkfontein, the total length of the connecting segment being over 300 miles. The line was completed at the end of June last, and by the middle of August through communication was established with Walfisch Bay. Though the country traversed is not likely to prove of much use in the meantime, yet the line shortens considerably the distance between the south-west and the parts of the Union east of and including Kimberley. The construction of a direct route from Upington to Kimberley is also in contemplation.

GENERAL.

Death of Julius von Payer.—At the beginning of September the death was announced, by wireless telegraphy, of the Austrian explorer, Julius von Payer, the discoverer of Franz Joseph Land. Von Payer took part in the German Expedition under Koldeway to the east coast of Greenland in 1869-70, and in 1871 made a preliminary journey to the Barents Sea, in company with a young Austrian naval officer, Lieut. Weyprecht. The main expedition started in the following year, and owing to the ship being caught in the ice off Novaya Zemlya, the party drifted about for a year. The archipelago, subsequently named after the Austrian emperor, was sighted at the end of this time, in August 1873, and on it the explorers effected a landing. Sledge journeys were then carried out, and Payer reached Cape Fligely, a point close to the 82nd parallel. In the summer of 1874 the ship was abandoned and the party made its way in boats to Novaya Zemlya. Von Payer received the Patron's Medal of the Royal Geographical Society in 1875. His book, containing a full account of the discoveries of the party, appeared

in an English translation in 1876 under the title of *New Lands within the Arctic Circle*.

EDUCATIONAL.

Summer School in Geography and Civics at the University College of Wales, Aberystwyth.—We have received the following communication in regard to this school (cf. p. 386) :—

The special circumstances of this year made it doubtful for some time whether the usual Summer School could be held, but eventually about fifty students entered for the courses, and they were held with perhaps an unusual measure of success. A course of eighteen lectures on the Geography of European Civilisation was given by Professor Fleure, and this course was supplemented by three most valuable interpretative discourses from Professor Patrick Geddes, entitled "The War and After." Mr. Whitehouse gave courses on Climatology and on Map Reading and Map Making, and a series of demonstrations was organised both in connection with the course on Europe and with these latter; practice with field instruments was also provided.

Members of the Provisional Committee for Regional Survey, including Miss M. M. Barker, Mrs. Davies (*née* Fraser), Mr. G. Morris, Mr. V. A. Bell, and Miss M. C. March, gave addresses, followed by discussions which were attended by members of other departments of the Summer School. In connection with these addresses a Civic Exhibition, containing the products of work at Saffron Walden, Bingley, King's Langley, Lambeth, and elsewhere, was kept open, and members of the Summer School were invited to do survey work on the Aberystwyth region during the progress of the course. Mr. A. Farquharson, of the Moral Education League, gave an address on Surveys for the purpose of moral and civic improvement, and Mr. Sidney K. Greenslade, the well-known architect, contributed a paper on "Aberystwyth as it might be," which aroused considerable interest and discussion. Miss M. Champness summed up the results of local survey work at the end of the course.

In addition to the field practice with survey instruments numerous excursions or field classes were organised for the systematic study of physical and human relations in the Aberystwyth district. Visits were paid to Talybont and Borth Bog, to Devil's Bridge, to Llyfnant, and elsewhere. Systematic work was also done in the Ethnographical Museum of the College, and special demonstrations were given with the 1 mile-1 inch Relief Model of Wales, which has been constructed in the Geography Department of the College for the National Museum of Wales.

NEW BOOKS.

EUROPE.

The Agony of Belgium. By Frank Fox. London: Hutchinson and Co., 1915. *Price 6s. net.*

Mr. Fox is a correspondent to the *Morning Post*, and the journalistic style is marked throughout the book. The sub-title explains that the volume is "Phase I. of the Great War," and hence deals entirely with the struggle in Belgium. We have read book after book on the same topic, but so interesting is the story, so profoundly touching is the tale of Belgium's heroic stand against the power and the frightfulness of Germany, that we welcome Mr. Fox's personal narrative. There is here no attempt at varnishing; for that alone the account deserves to be read. Are we not already apt to forget the horrors of Louvain and Termonde? In his last paragraph the author has good cause to write: "'Forgetting the Belgians' has been a great fault of the Germans in this war. I hope it will not be a fault of Europe in making the peace." Let those who are to make the peace read the personal narratives and they will not forget.

Step by step Mr. Fox follows the Belgian army from Liége, through Brussels and Louvain, to Antwerp and Ostend. He carries the reader with him, and though the journalistic touch may occasionally mar a sober account, the task of relating the agony of Belgium is well done, and as such we can recommend it.

The Romanisation of Roman Britain. By F. Haverfield. Third Edition, further enlarged, with Twenty-Seven Illustrations. Oxford: At the Clarendon Press, 1915. *Price 3s. 6d. net.*

Roman Britain in 1913. By Professor F. Haverfield. The British Academy Supplemental Papers. Oxford, 1914. *Price 2s. 6d. net.*

The first of these two pamphlets is devoted to a discussion of the evidence as to the extent to which the Britain of the Roman occupation was influenced in language, in material civilisation, in art, local administration, religion and so forth, by its conquerors. Such evidence is necessarily indirect and not very abundant in amount, but it is, according to Professor Haverfield, sufficient to warrant the conclusion that the province of Britain was to a large extent Romanised in its speech, its town-life and its social polity. But the area in which this occurred was chiefly the lowlands, and even here the Romanisation probably affected the townspeople and the upper classes in the country rather than the peasantry. In the uplands to the north, west and south-west, the Romanisation effect was minimal, and here the Britons remained Celtic, or at least capable of a reversion to the Celtic tradition. The subsequent disappearance of the Roman influence Professor Haverfield ascribes to two causes, one positive and one negative. In the first place, during the fifth century there was a definite Celtic revival, due apparently in part to a Celtic migration from Ireland to western Great Britain. Again, the invading Saxons attacked and plundered especially those lowland areas which had been most thoroughly Romanised, and before their invasion the exotic culture apparently went down.

While it is possible thus to summarise briefly the main thesis of Professor Haverfield's book, it is naturally impossible to give the detailed evidence upon which it is based. We can only refer readers to the book itself, in which they will find most interesting accounts of some of the more important Roman antiquities of Britain, special attention being given to Roman types of houses.

The second pamphlet gives an account of Roman finds in Britain during the year 1913, especially as regards inscriptions. There is also a useful summary of the books and articles on Roman Britain which appeared in 1913.

Modern Germany and her Historians. By ANTOINE GUILLAND. London: Jarrold and Sons, 1915. *Price* 7*s.* 6*d. net.*

The author of this book, who is Professor of History at L'École Polytechnique Suisse, has performed a distinct service in writing this volume, which is excellent both in conception and in style. Its main purpose is to trace the part played by her historians in the development of Germany, the formation of her national ideals, and in the evolution of imperial unity. The author endeavours very successfully to show how they helped to establish a powerful state upon the unpromising and originally infertile region of Brandenburg, "the poorest in Europe." The writer's method has been to select the works of several of the most typical historians of the Empire—Niebuhr, von Ranke, Mommsen, von Sybel and von Treitschke—and by an acute and penetrating, but always impartial, analysis of their theories, to make clear their influence in shaping and developing German sentiment and policy.

Few books are better calculated, without an exhaustive study of the historians themselves, to enable us to appreciate the German point of view, and to understand the quite legitimate imperial aspirations of her people, and at the same time to trace to their source some of the worst and most dangerous features in the policy of that empire. The writer readily acknowledges the qualities which characterise the best work of the German historians; nor is he blind to their defects. In his valuable introduction, when dealing with the immense learning of these writers and the spirit of their work, he remarks that "Few scholars have equalled them in scientific abnegation, in earnestness and patience in their researches. But they were not always able to derive from their learning accurate and reasonable ideas." And for this inability to make the best use of their diligence, or at least to do so without the most "disconcerting eccentricity," the author suggests two causes—the strength of their passion and the weakness of their insight. And recent events have certainly shown that such characteristics belong to Germany's politicians and administrators just as much as to her historians. But at least one of the latter was endowed with the gift of prophecy, when, in a lecture delivered in 1863, on the fiftieth anniversary of the Battle of Leipzig, he lamented that "No salvo salutes the German flag in a foreign port. Our Fatherland at sea has no flag—like the pirates." While making full recognition of the permanent value of much of the work of the German historians, we must agree with the author of this very satisfactory book, that "through their historical theories they have been the propagators of the worst political maxims, for the refutation of which humanity has already shed seas of blood."

Poland and the Polish Question. By NINIAN HILL. London: George Allen and Unwin, Ltd., 1915. *Price* 10*s.* 6*d. net.*

The first six chapters of this work are more or less historical, and contain a fairly full account of the vicissitudes in Poland's history. We reach the author's objective when we come to chapter vii.—"Poland (in Prussia, Russia and Austria) before the War." This is the really valuable section of the book, for in it is to be found the Polish problem as we know it at present. Interesting, though perhaps of less vital value to us, is the account of the capitals of Poland—Posen, Cracow, and Warsaw. Into the struggle on the eastern front two of these have largely

entered, and we are thankful for such information as will enable us to visualise the scenes of the titanic conflict. The book contains eleven illustrations and a map.

The War and the Balkans. By NOEL BUXTON, M.P., and CHARLES RODEN BUXTON. London: George Allen and Unwin, Ltd., 1915. *Price* 2*s.* 6*d. net.*

This little work is another illustration of the fact that it requires an expert (or experts) to write a small volume on a wide subject. The brothers Buxton are recognised authorities on the Balkan States, and the book under review is an able, condensed, thorough summary of the relations in which these States stand to the present war. The writers could have supplied us with a great deal more information about Serbia, Rumania, Greece, Bulgaria, and Macedonia, but what is given, so compactly and lucidly, is all that the average reader requires for an intelligent grasp of the Balkan problem. For their clarity we specially recommend chapters iii., x., and xi.; of the others those on Greece and Bulgaria are particularly good.

AFRICA.

The Wonderland of Egypt. By PERCY R. SALMON, F.R.P.S., with Illustrations by J. SHAW CROMPTON, R.I., HENRY A. HARPER, and other Artists. London: Religious Tract Society. *Price* 2*s.* 6*d.*

The story of Egypt has often been told, and the books dealing with its long and varied history, its antique monuments that are still a marvel and a mystery, its climate, and its people, are legion. With the vast library of literature bearing on this country, suiting one would think all tastes, it would seem that a book of this nature was scarcely called for. But Mr. Salmon has done his work well, and has utilised the knowledge of others and his own experience to produce a most interesting account of this "Wonderland." Business and pleasure took him to the country more than once, but it is evident that he went about with a seeing eye and a well-stored mind. The special value of his book is that he weaves into his narration of travel what literature, sacred and secular, ancient and modern, has to say of the various places. While therefore he has the younger generation chiefly in view as he writes, he supplies such helpful data bearing on the various historic sites of Egypt as mature readers will welcome. He traverses the whole land from the Delta of the Nile to its source, 4000 miles away at the Equatorial Lakes, though practically he stops at Khartum. There is a touch now and again, that detracts from his narrative, of the platform lecturer with his illustrated views. Apart from that criticism, the book serves its purpose excellently well to furnish an idea of the "Wonderland of Egypt." The illustrations are splendid, though the map is sketchy, and there is no index.

GENERAL.

The Economics of War and Conquest. By J. H. JONES, M.A. London: P. S. King and Son, Ltd., 1915. *Price* 2*s.* 6*d. net.*

Mr. Jones, who is lecturer on Social Economics in Glasgow University, here attempts an examination of Mr. Norman Angell's economic doctrines, more especially as these are contained in *The Great Illusion.* From the preface it would appear that Mr. Jones was at first a believer in the theories set forth by Mr. Angell, but deeper study of the underlying principles compelled him to reject the doctrines the latter expounded. It would be impossible within the limits of a short

review to deal adequately with this book or to give even an abstract of Mr. Jones's views. The writer shows no hesitancy in attacking such thorny topics as "War and the Credit System," and "The Indemnity Problem," and he must be congratulated on his courage and ability. Whether or not he succeeds in presenting a better case than that presented by Mr. Angell is a matter which cannot be discussed here. But it may be said that the reader will gain much by a careful perusal of this clearly written, closely reasoned little work.

The World-Wide War: First Stage. By Capt. A. Hilliard Atteridge. London: George Philip and Son, Ltd., 1915. *Price 2s. net.*

This small book contains a rapid account of the military and naval operations during the first six months of the war. On the title-page it is styled "a graphic record," and we think there is much justification for such a term. The author's qualifications are undoubted; the firm's cartographic skill is added to these; and the result is a brief but clear summary, just such an account as the busy man, who has not time to study the daily details, or the person who wishes to review the past operations, should read.

The Dardanelles: their Story and their Significance in the Great War. By the Author of *The Real Kaiser.* London: Andrew Melrose, Ltd., 1915. *Price 2s. net.*

This opportune little book, with its six illustrations and two maps, is a contribution, and a valuable one, to "war" literature. Well written, and the work of one who evidently knows his subject, the book deserves to be read by all who would wish to know the past history of the Straits, their significance in the Great War, and their place in the actual conflict. We specially recommend Chapters I., III., IX., and XI. The value of the volume would have been much enhanced by the insertion of a folded small-scale map of the area under consideration. It is surely not too much to ask that, when a geographical area is the subject of a text-book, all the places mentioned should be shown on at least a black and white map of a fair size.

Geography and World-Power. By James Fairgrieve, M.A. London: Published for the University of London Press, Ltd., by Hodder and Stoughton, 1915. *Price 3s.*

The sub-title of this work explains that it is "a text-book of matriculation standard illustrating the geographic control of history." To say that Mr. Fairgrieve's new book is very good would be merely a critical platitude; it is original, highly suggestive, and entirely on the right lines. The ideas are not necessarily new, but the treatment and the method are both alike original. For advanced students, who have grasped the full meaning of physical and climatic factors, there is now available a book which will show them, clearly and thoughtfully, how these factors "control" history. Pleasant to read, the book will make a wide appeal, and we have no hesitation in recommending it to both general reader and student. Professor Lyde supplies a Foreword, but, as he well states, "good wine needs no bush."

The introductory chapter deals with the explanation of the terms "history," "geography," and "control," and considers generally the chief "controls." The text then proceeds to the treatment of certain typelands—Egypt, Babylonia and Assyria, Phœnicia, Greece, Rome, Britain, Russia, Germany, China, etc., and the only adequate review is a thorough perusal of the separate chapters. We offer

just one criticism. It is possible to overestimate geographic control, and we feel a slight straining here and there in the different chapters. After all, mind and spirit are beyond material control, and in the march of events geography has not controlled all the steps taken. An outstanding feature is the series of remarkable maps with which the book is illustrated.

EDUCATIONAL.

Cambridge County Geographies: Staffordshire. By W. Bernard Smith, B.Sc. *Moray and Nairn.* By Charles Matheson, M.A. *Clackmannan and Kinross.* By J. P. Day, B.A., B.Sc. Cambridge: University Press, 1915. *Price* 1*s.* 6*d. each.*

Many of the preceding volumes of this series, both Scottish and English, have already been reviewed here; the present issues preserve the usual features, and come up to the high level of their predecessors. We may be allowed to direct attention to the excellent chapter on Geology and Soil in the Staffordshire volume, to the very fine illustrations in the Moray and Nairn one, and to the valuable account of the course of the Devon which appears in *Clackmannan and Kinross.*

Commercial Geography. By Alex. L. Curr, B.A. (Lond.). London: A. and C. Black, Ltd., 1915. *Price* 3*s.* 6*d.*

The preface to this, the latest, addition to the number of commercial geography text-books, states that the book "is designed for senior work in secondary schools and for intermediate work in technical colleges and universities." Well supplied with no less than 150 illustrations, both maps and diagrams, the volume is in every respect soundly geographical, strictly educational, and accurate. The writer is fully abreast of all the latest statistical information, and can make excellent use of this in his text. General principles and tendencies are not lost sight of amid a mass of facts, and a useful set of one hundred and thirty-two questions is supplied. The introductory chapter is well done, and we must recommend, too, the chapters on the Mediterranean Region, Monsoon Asia, Europe, and the United Kingdom. Were the book for junior work one might be inclined to cavil at the somewhat minute lettering and markings on a few of the figures. Among the figures those most valuable are, we think, the ones showing Railways and Routes.

Black's Travel Pictures: North America and the West Indies, and Australasia. Selected and edited by R. J. Finch, F.R.G.S. London: A. and C. Black, Ltd. *Price* 10*d. each.*

The first portfolio of the two mentioned contains fifty-one, and the second fifty, travel pictures; in both cases half the number are in colour. The editor in his note clearly states his reason for including the two types of illustration. Colour-pictures give a true impression of the "atmosphere" of a foreign country; photographic illustrations supply accuracy of detail. In these portfolios, so excellent in their format, the teacher has at his command one of the best aids in the teaching of geography; and he should certainly avail himself of the opportunity. The choice is just such as we are led to expect from a man of Mr. Finch's taste and experience, the notes are to the point, and there are in addition useful sets of "Problems and Exercises."

BOOKS RECEIVED.

Russia and Democracy: the German Canker in Russia. By G. de Wesselitsky. With a Preface by Henry Cust. Demy 8vo. Pp. viii + 96. *Price* 1*s. net.* London: William Heinemann, 1915.

Scottish National Antarctic Expedition: Report on the Scientific Results of the Voyage of S.Y. "Scotia" during the Years 1902, 1903, *and* 1904, *under the Leadership of William S. Bruce, LL.D., F.R.S.E. Vol. IV. Zoology.* With 62 Plates, 31 Text Figures, and 2 Maps. Royal 4to. Pp. xi + 505. *Price* £2, 15*s.* Edinburgh: The Scottish Oceanographical Laboratory, 1915.

The Dardanelles: their Story and their Significance in the Great War. By the Author of *The Real Kaiser.* Crown 8vo. Pp. 168. *Price* 2*s. net.* London: Andrew Melrose, 1915.

Geography and World-Power: A Text-Book of Matriculation Standard illustrating the Geographic Control of History. By James Fairgrieve, M.A. Crown 8vo. Pp. x + 356. *Price* 3*s.* London: Published for the University of London Press, Ltd., by Hodder and Stoughton, 1915.

The North-West and North-East Passages, 1576-1611. Edited by Philip F. Alexander, M.A. Demy 8vo. Pp. xix + 211. *Price* 2*s.* 6*d. net.* Cambridge: University Press, 1915.

Stories of Exploration and Discovery. By Arthur B. Archer, M.A. Crown 8vo. Pp. xi + 198. *Price* 2*s.* 6*d. net.* Cambridge: University Press, 1915.

Modern Austria: her Racial and Social Problems. With a Study of Italia Irredenta. By Virginio Gayda. Demy 8vo. Pp. 350. *Price* 10*s.* 6*d. net.* London: T. Fisher Unwin, 1915.

Serbia: her People, History, and Aspirations. By Woislav M. Petrovitch. Crown 8vo. Pp. 280. *Price* 3*s.* 6*d. net.* London: George G. Harrap and Co., 1915.

The Birth-Time of the World; and Other Scientific Essays. By J. Joly, M.A., Sc.D., F.R.S. Demy 8vo. Pp. xv + 307. *Price* 10*s.* 6*d. net.* London: T. Fisher Unwin, Ltd., 1915.

Denmark and the Danes: A Survey of Danish Life, Institutions, and Culture. By William J. Harvey and Christian Reppien. With a Map and 32 Illustrations. Demy 8vo. Pp. 346. *Price* 12*s.* 6*d. net.* London: T. Fisher Unwin, 1915.

The Private Diary of Ananda Ranga Pillai, Dubash to Joseph François Dupleix, Governor of Pondichery: A Record of Matters Political, Historical, Social, and Personal, from 1736-1761. Edited by Sir J. F. Price, K.C.S.I. Vol. III. Demy 8vo. Pp. xl + 468. *Price* 4*s.* 6*d.* Madras: Superintendent, Government Press, 1915.

The French in the Heart of America. By John Finley. Demy 8vo. Pp. xii + 431. *Price* 7*s.* New York, 1915. *Presented by James H. Hyde, Esq.*

In the Oregon Country. By George Palmer Putnam. With an Introduction by James Withycombe. Crown 8vo. Pp. xxi + 169. *Price* 6*s. net.* London: G. P. Putnam's Sons, 1915.

The Earth: Its Life and Death. By Professor Alphonse Berget. Translated by E. W. Barlow, B.Sc., F.R.A.S. Crown 8vo. Pp. xi + 371. *Price* 7*s.* 6*d. net.* London: G. P. Putnam's Sons, 1915.

The North-West Amazons: Notes of Some Months spent among Cannibal Tribes. By Thomas Whiffen, F.R.G.S., F.R.A.I. Demy 8vo. Pp. xvii + 317. *Price* 12*s.* 6*d. net.* London: Constable and Co., Ltd., 1915.

Geographical Aspects of Balkan Problems, in their Relations to the Great European War. By MARION I. NEWBIGIN, D.Sc. (Lond.). With a Coloured Map of South-Eastern Europe and Sketch-Maps. Demy 8vo. Pp. x + 238. *Price 7s. 6d. net.* London: Constable and Co., Ltd., 1915.

The Atlas Geographies: A New Visual Atlas and Geography Combined. (1) *The World and Its Peoples.* (2) *Earth Lore.* By THOMAS FRANKLIN and E. R. SHEARMUR, B.Sc. Pp. (1) 43; (2) 40. *Price 7d. each.* Edinburgh: W. and A. K. Johnston, Ltd., 1915.

Practical Geography Notebooks, based upon the Atlas Geographies. By THOMAS FRANKLIN, A.C.P., A.R.S.G.S., and E. R. SHEARMUR, B.Sc. *Asia.* Pp. 40. *Price 4d. net.* Edinburgh: W. and A. K. Johnston, Ltd., 1915.

Everybody's Aid to the Map-Reading of Central Europe. Compiled with special regard to Germany. Pp. 87. *Price* 1s. 6d. London: Wm. Clowes and Sons, Ltd., 1915.

Agricultural Statistics, 1914. Vol. III. Part I. *Acreage and Live Stock Returns of Scotland.* Glasgow, 1915.

Statement Exhibiting the Moral and Material Progress and Condition of India during the Year 1913-1914. London, 1915.

Coal Shipments: Tables giving Details as to Shipments of Coal Abroad, Coastwise, and as Bunkers, from each Port of the United Kingdom, for each Quarter of the Years 1913 *and* 1914. London, 1915.

Report on the Administration of the Punjab and its Dependencies for 1913-1914. Lahore, 1915.

Annual Statement of the Trade of the United Kingdom with Foreign Countries and British Possessions, 1914. Volume I. *Price* 5s. 9d. London, 1915.

Colonial Reports (Annual).—Leeward Islands (841); Gilbert and Ellice Islands Protectorate (842); Zanzibar (843); Turks and Caicos Islands (844); Seychelles (846); St. Helena (847); Fiji (848); Bahamas (849); Gibraltar (850); Sierra Leone (851).

Diplomatic and Consular Reports.—Trade of Bengasi (5426); Nanking (5455); Chiengmai (5446); Senggora (5447); Italy (5448); Salonica (5449); Aribistan (5450); Brazil (5451); Coquimbo (5452); Canary Islands (5453); Batoum (5454); Surinam (5456); Corsica (5457).

Thirty-Third Annual Report of the Fishery Board for Scotland, being for the Year 1914. Edinburgh, 1915.

Annual Report of the Department of Mines, New South Wales, for the Year 1914. Sydney, 1915.

United Provinces Gazetteer. 3 Volumes. Allahabad, 1915.

Central Provinces District Gazetteer. 2 Volumes. Bombay, 1914.

Punjab District Gazetteer. 1 Volume. Lahore, 1915.

Census of the Commonwealth of Australia, taken for the Night between the 2nd and 3rd April 1911. Vols. II. and III. Melbourne.

Report on the Administration of Bengal during 1913-1914. Calcutta, 1915.

Revised Supplement (2), 1915, *Norway Pilot.* Part I.
" " *Pacific Islands.* Vol. III.
" " *West Indies Pilot.* Vol. I.
" " *West Coast of India Pilot.*
" " *Arctic Pilot.* Vol. I.
London, 1915.

Publishers forwarding books for review will greatly oblige by marking the **price** *in clear figures, especially in the case of foreign books.*

THE SCOTTISH
GEOGRAPHICAL
MAGAZINE.

THE ROMAN CAMP NEAR ABERDEEN.

By G. M. Fraser.

(With Map and Illustrations.)

Formerly, in dealing with the construction that we call the Roman camp at Culter, it was necessary to discuss the question whether the Romans were in Aberdeenshire at all. That is not now necessary, for the excavations carried out in the summer of 1913 at the reputed Roman camp of Glenmailen near Ythan Wells, in this county, by Dr. George Macdonald, the highest authority, we may say, on Roman remains in Scotland, and Professor Haverfield, one of the chief authorities on Roman remains in the whole country, has settled finally, not only that the Roman forces were in Aberdeenshire, but that they were here in exceptionally large numbers. These excavations at Ythan Wells were undertaken in what may be termed a legitimately sceptical mood. Popular tradition had long associated that camp, as it has long associated this camp at Culter, with the Romans, and not only so, but General Roy, the antiquary and military engineer, the first to deal in a scientific way with the Roman remains in Scotland, gave a plan of the Ythan Wells camp in his *Military Antiquities of North Britain*, published in 1793. He gave also a plan of Raedykes camp, at Ury, near Stonehaven, and others in Strathmore, as well as of others in the far north up to the Roman works at Burghead on the Moray Firth.

When Dr. Macdonald and Professor Haverfield undertook their excavations at Ythan Wells, with the help of a Carnegie Grant in 1913, they did so with a threefold object in view. In the first place, they wished to test, in an Aberdeenshire case, the reliability of General Roy's plan in the *Military Antiquities*. In the second place, it was thought that a careful examination of the actual workmanship of the camp, or whatever the construction might turn out to be, might furnish some clue

to the nationality of the builders. Lastly, it was hoped that even a superficial search might lead to the recovery of some relic which would enable the date of construction to be fixed at least approximately.

It should here be stated that there was very little that a casual visitor could see on the ground at the Ythan Wells camp, only two fragments of what were supposed to be the turf ramparts which have survived to do duty as dykes dividing field from field. The remains on this camp at Culter, long known as Normandykes, are much more abundant, and better preserved. (See Figs. 1 and 2 on plate.)

The result of the excavations at Ythan Wells was that in Dr. Macdonald's own words—"The first two objects were satisfactorily achieved. The substantial accuracy of Roy's illustration was triumphantly vindicated by sections of the ditch which were laid open at various appropriate points. . . . The size of the fortified enclosure is remarkable. It covered 120 acres, a space sufficient to accommodate an army of not less than 15,000 men. The whole had been surrounded by a rampart about 20 feet thick, and a ditch which must have been at least 8 or 9 feet wide, and 4 deep. . . . Cuttings (in the rampart) showed that the ditch had had sloping sides, and that the rampart was constructed of loose earth and stones, laid, as it seemed, on a specially prepared bed of clay some two or three inches in thickness. . . . The clearing of the very first section of the ditch and rampart left on the minds of the excavators a distinct impression," says Dr. Macdonald, "that they were face to face with the work of Roman engineers, and as the digging proceeded the impression rapidly became a certainty. The form and design of the whole, the slope of the ditch, the extensive use of clay, the construction of the traverses—all these are characteristic." And he adds—"The camp at Glenmailen may confidently be set down as a memorial of the largest Roman army that ever penetrated to the remoter portions of our island. It must, of course, have been a field force, and the period of its stay would necessarily be brief. Hence the absence of relics."

This, then, settles finally that the Romans were in Aberdeenshire, that they were here in very large force, and that they constructed camps with turf ramparts and ditch, and that their work is recognisable even on the surface of the ground. The bearing of this on the authenticity of the camp at Culter is significant. General Roy did not give a drawing of this camp—probably he never heard of it—but he gave a drawing of Ythan Wells camp, which has been proved accurate, and he gave a drawing of Raedykes camp at Stonehaven, the remains of which are still remarkably clear (and were proved by Dr. Macdonald in a series of excavations in September 1914 to be absolutely authentic), and he gave drawings of the camps at Monboddo, Ardoch, and other camps in that quarter, that are admittedly authentically Roman. Now, the camp at Culter is on the direct route northward from the camps at Ardoch and Raedykes to the camp at Ythan Wells, and, apart from every other consideration, we may fairly take it that what is proved authentically Roman in regard to Raedykes and Ythan Wells applies to the camp at Culter, eight miles from the city of Aberdeen.

We now come to deal with this camp itself. One can see at a glance that its situation had been selected with great care for a body of troops operating in a hostile country, and liable to attack from any quarter. It is constructed directly opposite one of the ancient fords of the river, on the route from Kincardineshire into Aberdeenshire, which the troops who used this entrenchment had just crossed, and it is on the ridge commanding the Dee Valley, both east and west, as well as the road leading northward through the hills by the loch of Skene, the route taken by the force which marched for the camps at Kintore and Ythan Wells. Those who have visited the Roman wall in Northumberland will be struck by the similarity of this situation to that of the camp at Borcovicus, now fully excavated and exposed. This camp, like those of Raedykes and Ythan Wells, is much larger than Borcovicus, for the reason that Borcovicus was merely a sectional station on the wall, whereas this camp had to contain the whole of a large expeditionary force for the short time that it would stay on its march.

The size of the camp at Ythan Wells struck Dr. Macdonald and Professor Haverfield as remarkable. It has an area of 120 acres. This camp at Culter had been evidently the same size, for in 1845 — by which time it had been slightly encroached upon—it measured 938 yards long by 543 yards wide, which gives an area of fully 100 acres. Both camps were constructed evidently for the same expeditionary force. The rampart and ditch of the camp are to outward appearance of the same construction as in the other northern camps mentioned, but there is one feature that distinguishes this camp, I think, from any other Roman entrenchment in Scotland. That is the "entrance" to the camp from the river ford, which is about a quarter of a mile in the rear of the camp. It is noticeable that the "entrance," which is 70 yards wide from the river to the camp, has a rampart like the camp itself along each side the whole way, as if special precautions had been taken to protect the line of retreat to the ford, if retreat should become necessary. This "entrance" from the river to the camp is in the wild condition to-day that it has been throughout living memory, probably for centuries, except that in recent years it has been fenced to keep out cattle, and, like the camp itself, is periodically planted with young trees.

The evidence with regard to this camp is of two kinds—(1) Literary, and (2) Archæological.

In considering, first, the literary evidence, we must remember that investigation of these Roman remains in the northern parts of Scotland is comparatively modern, that is, not earlier than the second half of the eighteenth century. General Roy was not quite the first to devote special attention to them. That honour belongs to General Robert Melville, at one time Governor of the British possessions in the West Indies, who on returning to Scotland about the middle of the 18th century addressed himself to a study of the Roman occupation of Britain. In 1754 he drew the attention of Roy, then engaged as a subordinate officer of engineers on a survey of Scotland, to the entrenchments in Strathmore, and so he started Roy on the work that resulted in the publication of his *Military Antiquities of the Romans in North Britain*,

issued, as before mentioned, in 1793, which is really the foundation of later scientific knowledge of these Roman remains in Scotland. This means that we are not to expect any definite information with regard to this camp at Culter before that time.

In point of fact, we do get very good information about it at the end of the 18th century. In Sir John Sinclair's *Statistical Account of Scotland*, in which the different parishes were described by the parish ministers, we have reliable contemporary information as to conditions at the time. The parish of Peterculter was described by Rev. George Mark, the minister, in 1795, and this is what he says with regard to this construction, which had then, as it has still, the farm of Alton, or Old Town, at one end, and the farm of Hilton, or Hill Town, at the other:—

"The hill where the two men were killed by lightning is commonly called the Hill of Old Town. It does not rise to a great height, and has a pretty extensive plain on top, partly cultivated. On the NE. end is the farm of Old Town, and on the SW. end the farm of Hill Town. Betwixt them lies a heath. On the NW. side of it a wall and ditch run from NE. to SW. about three-quarters of a mile along the slope of the hill, which is there separated from the public road by a small valley. From each end of this wall, and almost at right angles to it, ramparts had been carried SE. towards the river Dee, which is about a mile distant from the angular points. Farmhouses, huts, folds, and tillage render these ramparts indistinct, but it is manifest that they had not been carried all the way to the river, the irregularity and rocky nature of the ground would have rendered that a difficult work. . . . At the NE. and SW. angles there had been half-moon works constructed. The top of the bank is, in some places, 8 or 9 feet above the bottom of the ditch. In most places the height is about 6 feet. But in the course of centuries much of the old wall must have tumbled down, and much of the ditch must have been filled up. No history to which I have access makes mention of this military work. Tradition has done no more than transmitted some names. The rampart is called 'Norman's Dyke': half cultivated lands adjacent to it are called 'The Norman Haughs.' A large formation near the western rampart bears the name 'Norman's Well.'"

The writer then goes on to suggest that it may have been a Danish encampment. It never entered his mind that it might be the work of the Romans. That was in 1795. Very soon after that, however, that is, in 1801, Colonel Shand, an officer of engineers, who followed General Roy in his interest in Roman remains in Scotland, examined this construction, and expressed the opinion that it was a Roman camp, and of the same construction as Raedykes, near Ury, the Monboddo camp and others in Strathmore that are now comparatively well known.

From that time it became definitely known as a Roman camp, although it retained the popular name of Norman Dykes, applied to it at some remote time because, doubtless, as a military construction, it became associated with the last great national invasion that the popular imagination found specially significant.

In 1822 James Robertson, M.A., F.R.S., who had already made an

Fig. 1.—Rampart and Ditch at west end of Culter Camp.
Photo by Robert Gibbon, Aberdeen.

Fig. 2.—Rampart and Ditch at Culter Camp, north front.
Photo by Robert Gibbon, Aberdeen.

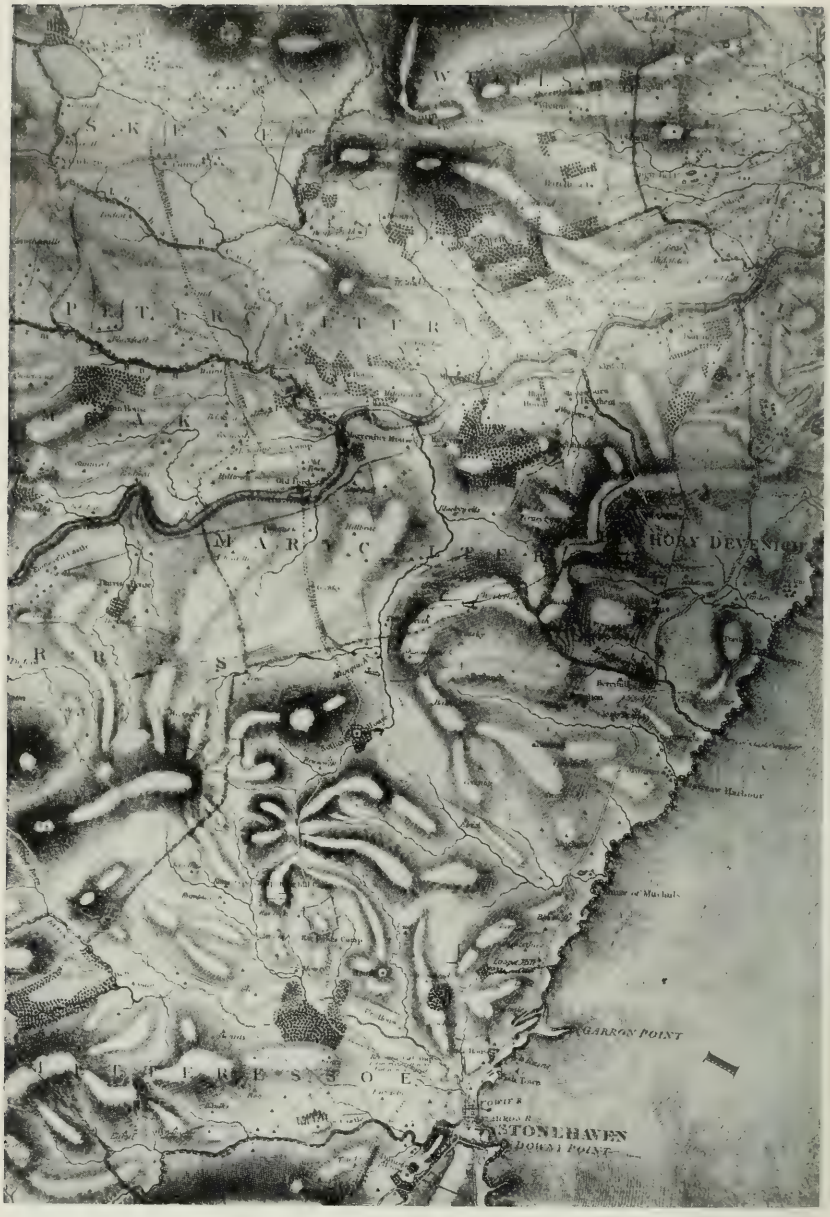


FIG. 3.—Map showing the relative positions of the Camp at Culter and the Camp at Raedykes, near Stonehaven, on the Roman *iter* or line of march. Reproduced from the Topographical and Military Map of Aberdeenshire, Banffshire, and Kincardineshire, by James Robertson, A.M., F.R.S., 1822. Scale, $\frac{3}{4}$ in. = 1 mile.

Photo by Fred. Hardie, Aberdeen.

exhaustive survey of the Orkney and Shetland Islands, the first scientific survey of that region, published his *Topographical and Military Map of the Counties of Aberdeen, Banff, and Kincardine*, a very large sheet, on the scale of one mile to the inch. He too paid special attention to the Roman occupation of Scotland, and this map is notable as the first that sets down the Roman "Iter," or line of march from the Monboddo camp northward. The route crosses the Carron water between Fetteresso Castle and Stonehaven to Raedykes camp at Ury. Thence it comes northward by Netherley House and enters Maryculter parish. It crosses the Dee by what Robertson marks in his map as the "Old Ford," and reaches this camp, a rectangular oblong area, as it is still, with the dimensions easily distinguishable. The "Iter" leaves this camp on the north front, and strikes north-westward over the Gormack and Leuchar burns, and through the parish of Skene, three-quarters of a mile east of the loch, thence by Kingellar, Kintore (where the remains of a camp on the line of the "Iter" are now almost entirely obliterated), Inverurie, Harlaw, Rayne and Culsalmond to what is set down as "Remains of a Camp," about a mile east of Ythan Wells, which is the camp that Dr. Macdonald and Professor Haverfield have now excavated, and found to be indubitably Roman. We need not follow the line of route further, but we just notice here that Robertson had Culter camp clearly marked, although it was omitted by Roy. It is more clearly marked even than Ythan Wells camp, which is now beyond discussion. A part of Robertson's map is reproduced to form Fig. 3 on the accompanying plate.

After 1822 the next significant piece of literary evidence as to this camp is the parish minister's description in the *New Statistical Account*, published 1845. The same procedure was followed in compiling that work as in Sir John Sinclair's great undertaking, and Rev. John Stirling, parish minister of Peterculter, says about this camp:—

"The remains of the military works mentioned in the former Statistical Account of this parish are now almost entirely obliterated. A small part of the dyke and ditch still remains, and forms part of the fence of an adjoining field. This work is usually called in popular tradition the Norman Dikes. In the former account of the parish, its erection is attributed to the Danes, or to William the Conqueror, but late investigators of the work have exploded this idea." Here the writer refers to George Chalmers's *Caledonia*, published Vol. i. in 1807, which set forth the investigations and opinion of Colonel Shand who held it as a Roman camp, as explained above. The writer goes on:—"This work has since been examined by Mr. Irvine of Drum and Professor Stewart, who agree in thinking it to be a Roman camp. It is of an oblong rectangular form, 938 yards long, and 543 yards broad, comprehending an area of 48 Scotch acres."

There is little more to be said as to the literary evidence. When the Ordnance Survey was made in 1865, published in 1869, the area, which was then practically the same as it is now, was set down as "Roman camp," and the well at the east end is duly marked "Roman well," although there is room for doubt as to whether the well is of Roman construction. The last edition of the 1 inch map, however,

designates the camp merely as "earth-work," and the well as "well."

Now we come to look for a moment at the archæological evidence on the subject. It is extremely interesting, but the precise significance of the various discoveries most people will wish to consider for themselves.

There is, first, a bronze sword, leaf-shaped, found in 1908 at Netherley, on the line of march from Raedykes camp to this one, now preserved in the Archæological Museum at Marischal College.

Then there is another bronze sword, leaf-shaped, found in 1809 under deep moss on the property of Balnagubs, Kincardineshire, slightly west of the line of march between Raedykes and this camp—presented to Marischal College Museum in 1878, and now preserved there.

A Roman bronze pot was turned up by the plough in 1837, in Durris, also slightly west of the direct line of march through Kincardineshire. The pot was rather injured by the plough, but has been identified as clearly Roman, and, like the other objects mentioned, is now in the collection at Marischal College.

But by far and away the most interesting piece of archæological evidence yet discovered is a collection of coins found sometime about the middle of last century near the red moss of Crathes adjoining the line of march from this camp northward. The collection, of something like a hundred coins, has been for many years in a drawer at Blairs College, and, strange to say, had never been scientifically examined until three years ago. In point of fact the existence of the coins was scarcely known, and the Glasgow Archæological Society's invaluable *Report on the Antonine Wall in Scotland*, published in 1899, which contained a list by Professor Haverfield of Roman coins found in Scotland, had no mention of this remarkable collection at Blairs. Three years ago, with the willing co-operation of Monsignor M'Gregor, rector of Blairs, the collection was examined, and twelve coins, the best preserved in the collection, were selected to be examined by an expert. They were sent to Dr. G. F. Hill, Keeper of the Coins and Medals Department of the British Museum, well known for his books on historical Roman and Greek coins. They were all found to be Roman coins, and certain of them are considerably later in date than any other Roman coins found in Scotland, with the single exception of a coin found in Cushnie, in the same neighbourhood, many years ago. The dates, indeed, are hardly less significant than the fact that the coins are Roman, for if these coins were part of the treasure of a Roman expeditionary force that passed through Aberdeenshire, then it puts the Roman operations in Scotland later than histories have previously had any idea of. Professor Haverfield, dealing with the list of coins already mentioned in the Glasgow Society's report, comes to the conclusion that "the whole land north of the Cheviots must have been lost (to the Romans) before or about 180 A.D." It will be seen that the coins of the Blairs collection bring the Roman operations in Aberdeenshire 150 years later than Professor Haverfield's date. Dr. Macdonald agreed generally with Professor Haverfield as to the lesson of the coins previously known, and in his remarkably fine work, *The Roman Wall in Scotland*, he says:—

"Commodus (161-192 A.D., the son and successor of Marcus Aurelius) is the latest emperor whose coins are normally found on sites that have been occupied by the Romans: and his coins occur but rarely." I now give the twelve coins of the Blairs collection as identified by Dr. Hill of the British Museum:—

1 and 2. Coins of Claudius I., A.D. 41-54.
3. Nero, A.D. 54-68.
4. Marcus Aurelius, A.D. 161-180.
5. Geta, A.D. 209-212.
6. Severus Alexander, A.D. 222-235.
7. Maximinus, A.D. 235-238.
8. Aurelian, A.D. 270-273.
9. Maximian, A.D. 286-310.
10, 11, and 12. Constantine the Great, A.D. 307-337.

That is practically all there is to say with regard to this camp, but I think I ought to mention the other "finds" of Roman coins in the north of Scotland as showing the significance of the route of the discoveries. There was a discovery of a collection of Roman coins in 1844 near Cowie Moss, Stonehaven, in the neighbourhood of the camp of Raedykes. A few years later another collection of Roman coins was found on the estate of Ury, Stonehaven, on which Raedykes camp itself is situated. Twenty of these were selected for the Museum of the Society of Antiquaries, Edinburgh, where they are still preserved. They range in date from the time of Nero to Severus. A gold coin of Constantine was found in Cushnie, which is a considerable distance west of the line of march from this camp but still connected with it: and a gold coin of Vespasian was found at Inverurie, directly in the line of march. A collection of Roman coins was found in the 18th century at Deskford, Banffshire; a bronze coin was found in Mortlach, Banffshire: a bronze coin of Titus was found at Forres, and a coin of Nero was found at Burghead where the Roman works are well known, which had evidently served as a port of embarkation. The only other Roman coins known to have been found in the north of Scotland were discovered, one in Rossshire and the other in the Shetland Islands. It should be added that in the camp at Raedykes was found many years ago a wheel supposed to be the wheel of a Roman chariot, which is still preserved at Fetteresso Castle.

But while it is thus known for certain that the Romans were in Aberdeenshire, the evidence given does not prove to a demonstration that this is a Roman camp. Only one thing can do that—excavation. The few weeks' excavations by Dr. Macdonald and Professor Haverfield at Ythan Wells settled finally that the Romans were there. And the excavations of Dr. Macdonald at Raedykes, a year ago, settled in the same way that the Romans constructed that camp. Similar excavations at this camp—even on the rampart and ditch—would settle just as quickly and definitely whether this be really a Roman construction or not.

The accompanying photographs were kindly taken for me by Mr. Robert Gibbon, Aberdeen, for use in connection with this article.

THE BRITISH ASSOCIATION AT MANCHESTER.

The Manchester Meeting of the British Association was undoubtedly a great success, and this despite the relatively small attendance (1438), the reduction in the number of meetings, and the shadow of war, the last being rendered evident—apart from the absence of many familiar faces—in the darkened streets as well as in various minor difficulties connected with transport. The reduction both in the number of members and of sectional meetings was probably a blessing in disguise, for in both cases it seemed to take the form of useful pruning. So far as one could judge from the attendance at Section E, the reduction of membership had affected those who have only a vague general interest in the scientific work of the Association to a greater extent than the specialists, and the fact that only three morning and three afternoon sessions were available made it unnecessary to attempt to pad out the programme in any way.

Section E held its meetings in the University Gymnasium, within easy reach of the Reception Room, and was to have been presided over by Major H. G. Lyons. At the last moment, however, the president was prevented from coming by press of official work, and his address was read by Mr. H. Yule Oldham. This address appears in our last issue (p. 505).

The presidential address was not the first item on the programme, so that the proceedings were opened on Wednesday morning, September 8, by Mr. A. R. Hinks, who spoke on "The map on the scale of 1 : 1,000,000."

The paper suffered a little from the fact that some of the maps which were to have been used in illustration failed to arrive in time, but it gave a vivid impression of the difficulties encountered in the construction of the various sheets, and of the means adopted to overcome them. Mr. Wallis followed with a short paper on "The Representation of the Distribution of Population on Maps," of which the following is the abstract supplied.

The purpose of this short paper is to introduce different methods of representing upon maps facts concerning population, and to elicit opinions and criticisms upon these methods in order to arrive at some conclusions which may be useful in connection with the million map. It has been suggested that the million map might be used to show (i) the density of the population and (ii) the distribution proportionally of the various peoples of Europe. For the purpose of illustration the Hungarian portion of the Buda-Pest sheet of the million map has been chosen, as it probably presents the greatest difficulties in this connection. The facts which are demonstrated are based upon the Hungarian Census for 1910 and upon three administrative divisions of the country: (*a*) the counties, (*b*) towns with an organised council, and (*c*) municipal towns. These legal divisions are not to be depended upon in connection with the population as is shown upon the maps.

Maps A and B show density of population. Maps C and D show the distribution of the peoples. Map A indicates density of population by the usual methods. Map B is due to a suggestion from Mr. A. R. Hinks; the principles of contour lines are applied to population. It is imagined that in each administrative area the population is evenly distributed and that the density value when located at the centre of the division can be treated in the same fashion as a spot height in

contouring. The net result is that the gradation of density is suggested in a continuous fashion and that abrupt changes and sharp angles in the boundary lines tend to disappear. Map C takes each nationality and shows its distribution as a percentage of the total population by the method of Map B. It is not easy to show more than three nationalities in any area, and this map does not indicate the presence of small minorities. Map D shows the complete facts numerically and is less pictorial though more detailed than Map C.

The paper was illustrated by an exhibition of the three maps described in it.

In the afternoon Mr. O. J. R. Howarth read a paper, illustrated by an exhibition of maps, on "Geographical Considerations arising out of the Visit to Australia in 1914: A comparison of Vegetation Maps." The paper was the first of a number bearing on the Australian area, and both in themselves and in the discussions to which they severally gave rise these papers showed the beneficial effect of the Australian visit on the geographers who had taken part in it. The freshness and vitality of both papers and discussions seemed to be directly related to the stimulating effect of the visit. A summary of Mr. Howarth's paper follows.

We have accustomed ourselves to think of the continent of Australia in terms of maps on very small scales. The use of such maps is justified, in part, by the fact that, speaking broadly, Australia is a continent singularly simple in outline and form. But the employment of small scales makes it the more important, on the one hand, that precision, where precision is possible, should be adhered to, and, on the other hand, that where precise data do not exist, precision should not be assumed.

Three maps are shown: on all of them the same colouring is used to show different types of natural vegetation, yet the appearance of each differs widely from the others. The maps, chosen practically at hazard, are labelled A, B, and C, and are enlarged from small maps to be found respectively in a standard authoritative work on plant geography, a well-known school-book, and a well-known atlas. In copying the representations of the various types of vegetation were standardised. Some of the main differences between the maps are here summarised:

(1) *Monsoon Forest of the North.*—Map A shows a continuous belt of it eastward from York Sound; B a continuous belt only east of the Victoria River; C shows the northern forest in isolated patches. A shows Cape York peninsula as wholly forested, B nearly so, C along the east coast only.

(2) *Forests of the Eastern and South-Eastern Highlands.*—A and B show a forest belt right along the eastern seaward slope; C interrupts this belt in the vicinity of Townsville (Queensland), bringing the grassland of the interior down to the coast. In New South Wales A gives the temperate forest and woodland an extreme width of 200 miles; C gives it fully 400; B gives an intermediate width. A, distinguishing "parklands, woods, and meadows" from "forest," allows the State of Victoria no true forest area large enough to be shown. B divides the south-eastern forest climatically (summer and winter rain forests) approximately along the political frontier between New South Wales and Victoria; C shows a division west of Melbourne—this distinction, however, is made merely between "broad-leaved forest" and "evergreen trees."

B shows the scrub area, interrupting the forest in the lee of the Flinders Range (Victoria, South Australia), which A and C ignore. A remarkable divergence of

opinion is seen respecting the forested area in the south-west of Western Australia.

Opinions may naturally vary as to what exactly constitutes forest, woodland, park-land, steppe, grassland, scrub or semi-desert and desert. But, as regards *grassland*, C allows a much smaller total area in Australia than A or B. B recognises a strip of steppe bordering the Australian Bight, which A and C ignore, though it is insisted upon in various official and other publications, especially in connection with the trans-continental railway now building. B and C distinguish *desert* from *semi-desert* or *scrub*, but their distinctions are at variance, C showing a rather elaborate outline of the true desert areas, which would suggest that complete data existed for laying them down. A (perhaps wisely from the general educational standpoint) applies the term "desert" more widely, to cover all these conditions. It is in the north of Western Australia that the three maps are perhaps most completely at variance.

Making every allowance for divergence of opinion as to the connotation of terms and for erratic draughtsmanship, it would seem that the vegetation divisions of Australia have been allowed to get rather out of hand. Probably the same is true of vegetation maps of this sort, and of other distribution maps, for other parts of the world. Though the present may not be the time to undertake such work, it is suggested that the scrutiny and criticism of existing material (whether original maps or verbal description) for the compilation of certain classes of distribution maps might be entrusted to a small committee of workers who would take up each his own topographical division after agreement on a general plan. Work might well begin upon data for vegetation maps (which ought to be of substantial value not only in the botanical but also in the economic geographical connection), and upon Australia.

In the discussion it was pointed out that as there are great local fluctuations in rainfall in Australia from year to year, statements which are true for one season, or even for a succession of seasons, may at another date have ceased to be true. Further, considering the size of the continent, and the small scale of the maps of which copies were exhibited by Mr. Howarth, it seems clear that the maps cannot be regarded as anything more than rough diagrams.

Mr. Howarth was followed by Professor J. W. Gregory, who spoke on "The Relations of the Central Lakes of Westralia," the main points of the paper being contained in the following summary.

The dry lake basins of Western Australia have been represented as hollows due to deflation by wind, to corrosion by ice, or to the action of a former sea. The author has described them as basins left by the dismemberment of a Miocene river system, and in 1914 published a sketch-map illustrating the course of the rivers so far as could be inferred from the levels then available. The issue of the southern sheet of a valuable "Contour Map of Western Australia," by the Lands Department of that State, throws much further light on the relief of the central plateau. According to that map the basins of the group of lakes, including Lakes Raeside, Ballard, Barlee, and Giles, are connected by land below the level of 1250 feet, and the only outlet from that many-branched depression was south-west through Lake Deborah to the Swan River. According to the author's sketch-map the drainage from Lakes Giles, Barlee, and Ballard passed through Lake Raeside south-eastward to the sea, which once, probably in the Miocene Period, extended from the Great Australian Bight northward over the Nullabor Plains.

The accurately determined railway levels from Kalgoorlie to Laverton indicate that the drainage from the Lake Ballard and Lake Raeside group was originally to the south-east. If the existence of the outlet from Lake Ballard through Lake Deborah be confirmed, this channel was probably of later date, and formed owing to the blockage of the south-eastern outlet through wind-borne drifts.

The Lands Department Contour Map indicates that the drainage from the country around Lake Way and Lake Wells, instead of passing south-eastward to the Nullabor Plains, flowed by a very circuitous route to the north and east of the Mount Margaret Goldfield instead of by the shorter route through the numerous lake basins between Lake Way and the former south-eastern sea.

The new "Contour Map" and contributions to the physiography of Westralia by Messrs. Gibson and Jutson are in favour of the origin of these dry lakes as remnants of an extinct river system.

Mr. J. MacFarlane followed with an account of the Burrinjuck Dam and the Yanco Irrigation Area, a paper which we hope to publish in a later issue. An animated discussion followed the reading of the paper, in the course of which Mr. MacFarlane's note on the connection between irrigation and an autocratic mode of government was commented on with illustrations both from the ancient and the modern world.

The final paper of the afternoon was to have been one by Dr. Rudmose Brown, on Australian Cities, but the author had been unable to complete the preparation of this paper owing to pressure of other work, and in its place Mr. Yule Oldham, who was in the chair, gave a short address on the Discovery of the Australian Coast, and also made a few remarks on the origin of the names of Australian cities, a subject in regard to which it is not easy to obtain facts.

The first half of Thursday morning was devoted to a joint discussion with Section C on "The Classification of Land Forms." This aroused great interest both among the members of E and of C, but unfortunately the time allowed proved too short, and the discussion came to an abrupt close before much in the way of a conclusion had been arrived at. Further, the difficulty of arriving at a consensus of opinion was increased by the fact that though the discussion was given an entirely general title, yet the opening paper dealt almost exclusively with a particular classification, and the first speakers tended to limit themselves to criticism of this classification, without trenching upon the wider question of classification in general.

Dr. J. D. Falconer opened the discussion with a paper which was in essence a brief abstract of the series of articles which he has published in this *Magazine* during the present year. He was followed by Professor Grenville Cole, who made an exceedingly witty speech, but seemed to regard geography as a purely descriptive subject, and one further whose development should be conditioned by the needs of the child of school age. Among others who spoke were Professor Gregory, Mr. Chisholm, and Dr. Hickling.

The second half of the morning was reserved for a joint discussion with Section H on "Racial Distribution in the Balkans," but this suffered from the fact that the members of Section E were late upon the scene. Of discussion in the literal sense there was indeed in this case

practically none. The proceedings opened with a paper by Professor G. Elliot Smith, who said :—

No adequate settlement is possible of the problems with which statesmanship will soon have to deal in the Balkans, especially when it is recalled that the present struggle is for the due recognition of the claims of race and nationality, unless the facts of geography and racial distribution are taken into consideration. But I want to make it perfectly clear at the outset that a multitude of other factors (with which we are not concerned in this discussion), historical, political, economic and religious, must determine the application of the facts of ethnology if any stable agreement is to be arrived at ; and even so, that the primary element in the establishment of a real peace is the acquisition on the part of the peoples concerned of the art of tolerance and the spirit of compromise in attempting to realise their legitimate national aspirations.

The geographical situation of the Balkans—its peculiarly distinctive relations to Europe, Asia, and to the Adriatic, Ægean, and Black Seas—marked it out even in prehistoric times as a place of ethnic confusion, exposed on three sides to maritime people, not only of Mediterranean, but also of Armenoid stock ; on the north quite open to incursions of all kinds of people from Europe and Asia ; and as the threshold of Europe the natural meeting-place of Europeans and Asiatics passing respectively to and from Anatolia. The configuration of the country favoured segregation of groups of people and helped towards disunion. These factors have influenced its history and disturbed its peace for fifty centuries. Interposed between Rome and Byzantium it was in turn subject to each, and the scene of strife between warring empires and religions. It has been exposed to a long succession of raids and immigrations from Goths, Huns, people of Ugrian and Turki origin, and Slavs ; and when various settlements of these took possession of a large part of the peninsula and amalgamated with their predecessors to form the two great Slavonic nations—Southern Slavs and Bulgarians—the intrusion of the Turks foisted upon the Balkans a new oppression and another religion to add to its unrest. Since then the rivalry between Hungary (with the Teutonic Powers) and Russia has played havoc with the Balkan Powers. A minor difficulty has been added by the problems of the Jews.

The elimination of Turkish influence from the Balkans, where neither the amount of Osmanli blood nor administrative achievement justifies its retention, reminds us that the Turk is not responsible for the amazing tangle there ; he was merely an aggravation of an already involved situation, to the complexities of which his race, religion, and methods of government added a potent element of confusion. His approaching departure will still leave the most difficult problems unsolved.

In spite of all the conflicting interests created by different religions and histories, ethnological considerations, no less than geographical and economic circumstances, clearly and definitely link together the Slovenes, Croats, and Serbs as one people united by a common origin and literary tradition ; and as a race whose domain includes not only the whole of Croatia (with Slavonia), Bosnia, Herzegovina, Montenegro, and most of Serbia, as at present delimited, but also Dalmatia, nine-tenths (all except Trieste and its neighbourhood) of Istria, Carniola, and a strip of Southern Hungary. This is the territory of the Southern Slav nation.

On ethnological grounds Bulgaria has a greater right than Serbia to the part of Macedonia now in occupation by the latter ; and as regards the Dobrudja, with

its confused jumble of races, Bulgaria's claim to its possession is clearly much more justifiable on racial grounds than that of its present occupant, Roumania.

The latter is not a Balkan Power, either geographically or ethnologically. Yet for historical reasons it cannot entirely be dissociated from the discussion of the other peoples. Beyond the boundaries of Roumania, the population of parts of Russia (Bessarabia), Austria (the Southern Bukovina), and Hungary (Transylvania), and the north-east corner of Serbia is mainly Roumanian.

It would make the discussion far too diffuse if we were to deal with the question of Albania: the distinctive ethnic and historical features of the Albanians and the racial problem in Greece and the distribution of the Hellenes. These matters will be considered only in so far as they affect the problems of the Southern Slavs.

Professor Smith was followed by Sir Arthur Evans, who showed a diagrammatic map of the Slav territories east of the Adriatic, and described briefly the important points shown. A copy of this map is now on view in the Society's rooms. Its most interesting feature is the suggestion that a short railway line should be constructed to link up Gradisca and Laibach. This would permit of the establishment of a new overland route to Constantinople via the Simplon, Milan, Agram and Belgrade, which would thus avoid Vienna and Buda-Pest. Another interesting railway line suggested would start from Spalato and by a difficult route reach Sarajevo, passing thence to Vishegrad and Ujitze, and so to Nish. From Nish it would reach Kladova on the Danube, thus forming an Adriatic-Danube line. The whole of this line so far as shown is represented as "projected" merely, so that it is not clear to what extent, if at all, it is proposed that existing railway lines, *e.g.* the segment from Sarajevo to Vishegrad, be incorporated in the new through route. It seems clear, however, that it is not purposed to utilise the existing narrow gauge line which follows the Narenta valley during part of its course from Metkovich to Sarajevo. We understand that Sir Arthur Evans is to speak before the Royal Geographical Society on the map, and his address will no doubt give fuller details in regard to the proposals. The other features of the map are chiefly that it shows the distribution of the different races and religions in the area considered, and trenches also upon some delicate political matters which cannot meantime be discussed here.

In the afternoon Mr. P. M. Roxby gave an account, illustrated by lantern slides, of North China and Korea. We hope to publish here at an early date a paper from Mr. Roxby on this subject. Dr. Rudmose Brown followed with a paper on Spitsbergen, of which the main points are the following:—

Last summer Dr. W. S. Bruce led an expedition to Spitsbergen which was supported by a grant from the British Association. Owing to abnormal ice conditions the projected work on the east—in Wybe Jansz Water—could not be carried out, while difficulties arising out of the war curtailed the work on the west. Dr. Bruce's absence in the Seychelles has prevented his presence at this meeting to give an account of his voyage, but the present paper embodies some of his work. Spitsbergen remains a No Man's Land despite the many acquisi-

tions of land by subjects of more than one nation. Insecurity of tenure and considerable lawlessness are the result of this lack of control, and the economic development of the country is hindered. Among the minerals which occur in Spitsbergen are large quantities of coal, magnetite, and gypsum. Valuable marble is also found. Almost all the mineral-bearing territories on the west have been claimed by different companies, chiefly British; the east is less accessible, but several British claims occur there also. Altogether British subjects claim about 7000 square miles of territory, on which several mines and quarries have been opened. Americans have the most valuable coal-mines, exporting annually large quantities to the north of Norway. It is Tertiary coal, but of excellent steam quality. Russian enterprise in Spitsbergen ceased over fifty years ago when Russian trappers stopped frequenting the land. Lately there have been some small attempts on the part of Russians to acquire mining claims. Swedish activity has always been chiefly centred in exploration, particularly of a geological nature. Norway has a few unimportant mining claims, and a few years ago erected a powerful wireless installation. German claims were never of importance.

Hunting fur-bearing animals is a dying activity, due to the approaching extermination of the game by ruthless hunters. On the west game is now very scarce.

The proximity of Spitsbergen to the British Isles and the mainland of Europe is generally overlooked owing to the use of Mercator maps. From Norway it is only 400 miles, and it is within fifty hours' steaming by a fast cruiser from our shores. The west coast is remarkably free from ice, even in midwinter, and the winter climate does not preclude the continuance of mining throughout the year. In winter a number of miners are at work on British and American mines.

Friday morning was devoted to three local studies, and to the Report of the Committee on Atlas, textual and wall maps for school and University use. This latter was presented in part to the Birmingham Meeting of the Association. Since that date the Committee have taken advantage of the Association grant given to them to do some experimental work in cartography, and some specimens of the maps which they had had prepared were included with the report. This consisted of two sections, a first devoted to the desirable contents and arrangement of a school atlas, and a second to problems of style and draughtsmanship. The first part contains a list of kinds of maps which it is desirable that the senior and junior atlas respectively should contain. As the second part deals with matters of more general interest, we give below the more important points in the Committee's own words:—

Style of Draughtsmanship.—Most atlases still err on the side of excess of names, though in some quarters there has been great improvement of late. The atlas should be provided with a place index, giving latitude and longitude of important sites not named on the plates. This would enable the student to add the names which he requires for his own purposes on a blank outline. The use of such blank maps has increased greatly in recent years, and it is desirable that a school atlas should be so published that its maps may be obtained also singly, both fully coloured and also in outline.

Where both orographical and political maps of one region are provided, no names but those of physical features should appear on the orographical map. The

maps should have as little as possible in common beyond the outline, rivers, and railways.

Colour.—The "layer-system" is almost universally used for the expression of relief in school atlases. Intermediate heights may be shown by conventionalised hachuring. Contours on such maps can give but little idea of form, and are not recommended except when required in printing, as to bound the colour bands. In nearly all the atlases examined the colours were found to be too deep. The Committee confidently recommends that the colour-scheme adopted for the International Map 1 : 1,000,000, and based on the teaching of physiological optics, be followed as closely as possible for all physical maps.

For the sea, deepening shades of blue should be used, not white, the depths being indicated in feet rather than in fathoms: for lakes, the same blue as for the shallowest sea. Rivers and river names should be in blue. Red lines which stand out well from the background can be used to show political frontiers on an orographical map. Colour indicating relief should not be interrupted at the frontiers but carried to the margin of the map.

Gloss.—It is important that no glossy inks or super-calendered paper should be used for a school atlas. The reflections from a glossy surface are apt to injure eyesight, partly by interfering with binocular vision. Maps, coloured or uncoloured, can be produced without extra expense on paper from which the specular reflection at 45 degrees does not exceed the diffuse reflection.

Lettering.—With reference to style of lettering, for the larger sizes the best style is one approaching sans-serif. The italic when used for the larger sizes, or with too frequent distribution in any size, is apt to produce a dazzling effect. On the other hand, italic by its obliquity gives a larger letter for a given height, and this increase of size is particularly advantageous with smaller names; it also affords a useful model for students to copy in manuscript. A sparing use of italic for small names is therefore recommended, together with a sans-serif style for all permissible sizes.

Projections.—Few varieties of projection should be employed in a school atlas. For hemispheres, Clark's Minimum Error Projection is best; the Globular Projection is to be avoided. For Continents and for the larger countries, Zenithal Equal Area; for the smaller countries a simple conical development. The excessive distortion of Mollweide's Homolographic Projection makes it unsuitable for school use. From the body of the atlas, Mercator's Projection should be excluded; it can, however, be effectively employed as an Index Sheet. It is an excellent lesson in distortion to plot carefully on a Mercator's Projection the areas covered by the individual maps of the atlas. We consider that hemispheres maps should be much more freely employed, since they are the most accurate representations (except the globe) of the earth's surface. Where practicable, they should be used to exhibit world distributions of all kinds. It has been stated already that the scales employed should be few and as a rule simple multiples one of another. On each map the scale should be clearly stated. In the margin should be indicated other towns in the same latitude and also (on maps of wide extent) the area of a quadrilateral of the network.

Conventional Signs.—In general, conventional signs should not be multiplied or created *ad hoc*. The few recognised signs are sufficient, unless to indicate any new feature, such as a first-class wireless telegraphy station, or the employment of river water for power or irrigation. The limit of navigation on a river may well be shown by an anchor. The solid black dot for town sites has advantages over the fine open circle, as better revealing concentration of urban population. Larger towns require a larger dot or a dot within a circle. Railways

and canals should be shown by single lines of a distinctive character; a fine single black line should be avoided. On large-scale maps a symbol is required for roads also, since motor traffic has restored their significance.

Words or conventional signs indicating the distribution of economic production are strongly deprecated. If economic factors must be exhibited on a general map, solid colour or shading should be used to show the concentration of industrial population, or the locality of high production of two or three commodities of first importance.

Black and white maps in school books (textual maps) should not attempt to supersede atlas maps, but should be confined to their function of illustrating statements in the text. Mechanical shading is often either too coarse or too light. The use of large areas of solid black should be cautiously exercised. White letters on a black ground, and black letters on a shaded area, too often tend to print obscurely. The size of type, if intended to be read, should be as carefully considered as in the atlas, and additional allowance should be made for imperfection and reproduction. Over-reduction in the camera from the original drawing is one of the commonest faults in block-maps, and owing to limitations imposed by the size of the page, the fault lies usually in the drawing. In general a textual map must be simple and not attempt to show high detail, and features tending to mutual obscuration should not be shown on the same map. Thus the same phenomenon for different seasons or associated phenomena (*e.g.* isotherms for January and July, or isotherms and isohyets) should not be shown on the same map—the particular examples cited apply equally to coloured maps. But this rule is not rigid. It is sometimes difficult to compare the phenomena shown on two maps (*e.g.* the climatic and the form divisions of a large country) when the two might have been exhibited on the same map without obscurity.

Wall Maps.—The recommendations of the Committee in regard to the style of a school atlas apply almost without modification to wall maps.

The scales employed should be as few as possible, and should be simple multiples of each other. This is more easily arranged in a set of wall maps than in an atlas, because there is here no necessity that the maps should be of uniform size, or that the amount of margin should be uniform throughout the series. For the same reason, it is far less necessary that the map area should be foursquare, especially in maps of continents and oceans, where every effort should be made to emphasise the fact that the objects represented lie upon a spheroidal surface. Awkward blank areas in the margin, which would be distressing in an atlas-page, are invaluable for supplementary letterpress in a wall map; though they should never be so far filled up as to prevent the map itself from standing out boldly on the sheet.

The far larger scale of a wall map is no excuse for the introduction of minute detail or a crowd of names. A wall map is essentially a diagram. The use of wall maps without names, or with only a few names or initials appended to town-dots or the mouths of rivers, is greatly to be encouraged. Some French wall maps are printed in duplicate, back to back, with the names on one side, and the physical features and town-dots, unnamed, on the other.

Even more than in the atlas, colour shows relief better than contours. Inclined illumination from the north-west gives, in skilful hands, an almost pictorial effect. The colours of a wall map should not, however, be too bright or deep, with the single exception of the scarlet which is appropriately used for all kinds of arbitrary lines.

Wall maps are often too elaborate and costly. The paper must, however, be good enough to stand occasional cleaning with breadcrumb or soft indiarubber.

The use of inferior paper has led to the current practice of varnishing the surface. Varnish has fatal effects upon a map. The reflected light from the surface makes the map useless to a large class in a well-lighted room and actually diminishes the amount of light from the printed and coloured surface below. There are very few kinds of varnish in use which do not turn brown or yellow with age.

It should always be remembered that the wall map is intended to supplement but not to replace the atlas. Most wall maps fail by attempting too much.

The discussion which followed the presentation of the Report shows that the subject is a very thorny one, and requires much care in handling. The committee asked for reappointment.

Mr. Raymond Curtis read a paper on "The Distribution of Population in the District round Leek," which was of a very detailed nature. The more general points are summed up below :—

Leek is situated at the southern extremity of the Pennine uplands in an agricultural region with some industrial development. The type of agriculture (depending upon the relief and soil) and the industrial development, past and present, largely explain the relative density of population in different parts of the area. In the agricultural development of the district it is possible to distinguish various stages in the evolution of a market town. A village nucleus of farmhouses arose at various places throughout the area wherever considerations of defence, ease of communications, water-supply, etc., led to a grouping together of habitations. The subsequent growth and development of this village nucleus depended mainly upon two factors—the area and the productivity of the region of which it was the focus. The stages of growth may be conveniently classified as the "inn-village" (*e.g.* Gradbach, Heaton, Bottomhouse), the "shop-village" (*e.g.* Meerbrook, Horton, Grindon), the "fair-village" (*e.g.* Hartington Flash), and last, the market-town (*e.g.* Leek, Cheadle, Longnor). For various reasons, but mainly through the development of communications, Leek now dominates the whole area. The main industries of the region which have affected the density of population are coal mining, cotton, silk, and copper manufacturers, and silk-dyeing.

The second paper, by Mr. C. B. Fawcett, was devoted to a detailed study of the Middle Tees and its Tributaries, and is, we understand, preliminary to a general investigation of the region. As the district is one of considerable interest we give the abstract in full :—

The streams here considered are the middle portion of the Tees and its tributaries from Stainmore to the eastern end of the Carboniferous rocks of the Pennines. The district which they drain is characterised by the presence of three distinct types of topography, viz. :

(1) A wide and comparatively smooth upland surface, sloping gently eastward, but cut off abruptly to the west by the Pennine Scar, with a few hills rising above it.

(2) A series of wide, shallow, mature valleys.

(3) A series of narrow and youthful valleys, which are for the most part sunk below the floors of the mature valleys.

The rocks of the district are almost entirely of Carboniferous age, mainly Lower Carboniferous limestones and shales in the southern half and Upper Carboniferous sandstones and shales in the northern. The complex topography is not primarily due to the rock structure, which is quite simple; but must be

ascribed mainly to the work of the streams, influenced in some cases by lines of faulting.

Of these streams the middle part of the Tees is the longest and much the largest. It enters Middle Teesdale from the Upper Dale by the Eggleston Gap, with a sharp change in its general direction on doing so. It then flows for about six miles in an almost straight trench at the foot of the fault-line scarp of Marwood Scar, receiving several tributaries from the west and none from the east. At Barnard Castle the Tees bends eastward, and thence flows, along an arc convex to the south, to its junction with the Langley Beck through a series of alternating gorges and wider terraced valleys. On joining the Langley Beck the river resumes its ESE. direction, and two or three miles lower it leaves the Carboniferous rocks.

The largest of the tributary streams is the Greta. This rises in Stainmore Pass and flows eastward in a well-marked trough valley, in which part of its course is underground. East of Bowes it also flows in an arc convex to the south, but the general direction of its upper course is continued by a small stream, the Tutta Beck, which it intercepts near Greta Bridge. The Greta finally joins the Tees through a very narrow and steep gorge. About its lower course at least three changes in the drainages line are traceable. The original consequent valley was continued directly eastward to the lowland : it is now occupied by three distinct streams, the R. Greta and the Tutta and Clow Becks. First the Greta was captured by a tributary of the Swale and diverted SE. to that river. In its later diversion to an arc south of the direct valley line the Greta resembles several other streams in the neighbourhood. Lastly, at a very recent period it was captured by a small tributary of the Tees.

The second of these streams is the Balder, parallel to the upper Greta. This has lost its headwaters to the Eden system at a fairly recent period, and the capture has left at Balderhead a low pass through the Pennine crest. Its tributaries show clear examples of the development of a complex river system by successive captures of originally distinct and parallel consequent streams.

Of the lowland streams the chief is the Langley Beck. This flows in a wide dale which continues the general direction of the Upper Tees and is approximately the chord of the great southward bend of the middle Tees. In the Staindrop Plains, an area of marsh finally reclaimed only a century ago, the Beck is diverted southward to the Tees through a valley which is much narrower and younger than Langleydale. The main valley is continued eastward and occupied in turn by the Langton and Cocker Becks before it is merged in the lowland. This northern west-to-east valley is very similar to the one south of the Tees which is occupied by the River Greta and the Tutta and Clow Becks. These valleys contain many examples of the early effects of a human interference with stream development.

There are thus in Middle Teesdale two principal west-to-east valley lines. The development of these valleys, the subsequent union of their waters in the Tees, which flows between them in a much younger valley, and the absorption of the smaller streams into the river system explain the great width of Teesdale in comparison with the neighbouring dales and the chief peculiarities of its streams. The direction of the consequent streams is a few degrees north of east, with a tendency to convergence from north and south due to the greater elevation of the Cross Fell and Ingeborough domes. The Tees crosses the consequent valleys, along a line determined mainly by fault-lines in the strata, and has thus become the master stream.

Except for the parts of streams in fault-line valleys and in subsequent reaches due to stream capture, there are few subsequent, and still fewer obsequent,

streams; hence the river system as a whole is in a comparatively early stage of development. It is, however, the product of at least three distinct cycles of erosion:

1st. The comparatively smooth surface of the upland is part of a peneplain. If its valleys were filled up it would be a plain sloping gently eastward, with its surface cutting across the rock strata at a small angle. The formation of this peneplain probably occurred during the Tertiary era.

2nd. The wide shallow mature valleys mark the second cycle. Their shallowness indicates that the change of base level which caused their formation was small; and their relation to the glacial drift and the route of the ice indicates that they had reached their full development before the Ice Age. The elevation which led to their formation probably occurred in the latter part of Tertiary time. The main consequent valleys are all of this type: and the more important of the subsequent valleys are also pre-glacial, though somewhat younger. The Ice Age does not seem to have caused any serious changes in the stream lines of Teesdale; but the extensive river terraces of many of the valleys probably date from the period following the melting of the ice.

3rd. The deep and narrow gorges in which many of the streams flow are the product of the last cycle of development, which is still in a very youthful stage. Its initiation was due to a post-glacial uplift of the region.

The change from the second to the third cycle is readily seen in the longitudinal sections of the streams, most of which show very marked changes of slope. The fall is usually much greater in the lower course than in the middle. A typical tributary valley consists of three clearly marked sections. First, the upper course on the upland with a very slight valley. Second, a broad and shallow valley on the floor of which the stream meanders. Third, a gorge in the bottom of this wide valley in which the stream rushes along over a series of rapids. These three sections of the valley repeat the three types of topography which characterise the district as a whole, and are the results of the three cycles of erosion to which its present form is due.

Professor H. J. Fleure read a paper on "Some Considerations on Former Movements and Distribution of Population in South Britain and its Influences," in which he laid much greater stress than is usual upon the Celtic element in the population.

Friday afternoon was given up to a stimulating paper by Professor Patrick Geddes on "The Study of Cities," after which the section adjourned to the School of Technology, where a demonstration on an exhibition of maps, pictures, books, etc., bearing upon the subject was given by Professor Geddes and Miss Barker.

In regard to the work of other sections, it is perhaps sufficient to call attention to Professor Grenville Cole's presidential address to Section C (Geology) in which the view, already set forth in Professor Cole's *Growth of Europe*, of the abruptness of certain geographical changes received further treatment. As an example, Professor Cole discussed the development of the Vistula system, stating that this river, with its tributary the San, formed a part of a great river system which once flowed from east to west along a line now marked by the marshes of the Netze, at a time when the Fennoscandian ice rested along the line indicated by the Baltic Heights. As the ice-front shrank backwards, towards the Baltic

basin, he believes that south-to-north streams flowed into that basin, cutting their valleys in the sands and boulder clays. Some of these rivers were able to cut their valley heads back southward, and tap the great east to west river. This was done near the present Kustrin, and thus the present Oder was formed, and near Fordon, where the Lower Vistula was formed, the bend due to capture being visible at the present day. "It is quite contrary to our customary philosophy, but a good corrective all the same, to ask ourselves if this lower valley of the Vistula, eighty miles in length, was shaped in a few months or a few years. The main part of the excavation, across unconsolidated lands, may have occupied less time than the building of the strongholds at the fords."

The Association Meeting next year is to be held at Newcastle-on-Tyne, under the presidency of Sir Arthur Evans, but final arrangements will not be made till about next March. The place of meeting in 1917 is to be Bournemouth.

PTOLEMY'S ATLAS: FIFTH ARTICLE.[1]

By G. Schütte, Ph.D.

(*With Illustrations.*)

Prototype C.

The literary milieu of Prot. C was stated by us to be that of the Roman itineraries, such as the Tabula Peutingeriana and the Itinerarium Antonini, cf. this *Magazine*, vol. xxx. p. 71. Provisionally, this conclusion was drawn only from some scattered equations, already suggested by C. Müller. Further researches have confirmed our provisional observations beyond expectation, as the reader will notice from the sketch below, Fig. 1. We may now state expressly that Prot. C is not only related to the itineraries mentioned, but shows itself all traces of the itinerary type.

On the other hand, our continued researches have obliged us to withdraw or to modify some of the suggestions made in our first paper.

a. Relations to other Prototypes.

In vol. xxx. of this *Magazine*, p. 621, we withdrew the equation suggested in the same volume, p. 70: Amisia Prot. C = Alison Prot. Aa. The Ptolemaic town Amisia near the homonymous river actually existed and still exists as Ems on a homonymous river in Hessen-Nassau. It belongs to Prot. Ab; the fortress of Luppia, also assigned by us to Prot. C, probably belongs in reality to Ab.

A more important alteration of our views affects the demarcation of Prot. C against Prot. D. On the Ptolemaic map, Prot. C is most obviously betrayed by its constant eastward displacement. The same displacement characterised parts of our assumed Prot. D, whereas

[1] For earlier articles see p. 371 *et antea*.

others, such as the "Swabian" tribes of Angles and Langobards, are displaced in exactly the opposite direction.

The parallel displacement would of course make the distinction of

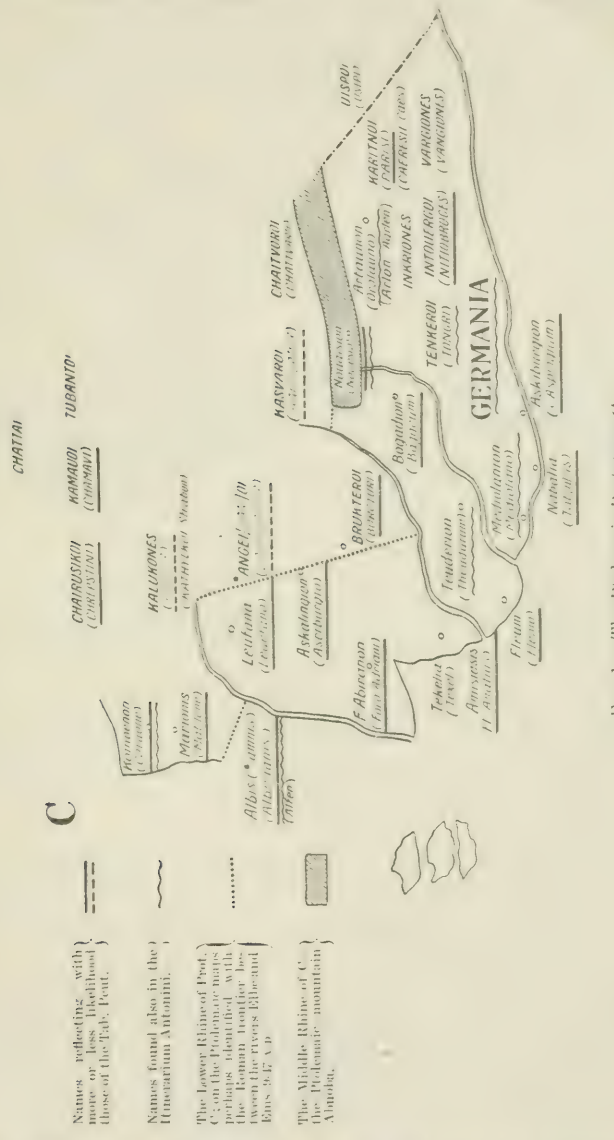


Fig. 1. The Ptolemaic Prototype C.

the two prototypes difficult, but we believed that we had found firm ground in the duplicate Chaimai = Kamauoi. As the tribe Chaimai stands among Belgian towns evidently belonging to C, we assigned it to this prototype. Consequently, its alter-ego Kamauoi would belong to

D, and this prototype would hence lay claim to the entire surrounding milieu of tribes: Chairusikoi, Chattai, Tubantoi, etc.

Having divided the prototypes in this way, we further searched for physical lines which might conceal the original framework of C and D. And we suggested that the Ptolemaic mountain Melibokos might be regarded as representing the original Rhine of both prototypes, only in the opposite direction: in C, east-west must be reconstructed as north-south, whereas in D it would be south-north. See figures 6 and 7 in the first article, vol. xxx. p. 57.

The above theory of division would be certain, if it could be taken for granted that the Ptolemaic Chaimai belonged to Prot. C. Later, however, we noticed that their pertinence to C is less certain than we had thought at first: in spite of their eastward displacement, they might also belong to Prot. Aa. The Ptolemaic North-Sea tribes derived from Prot. Aa may not necessarily all be correctly localised. As a matter of

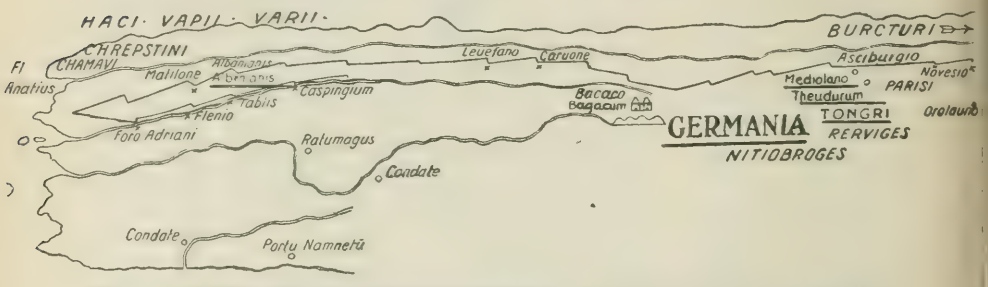


FIG. 2.—The NW. section of the Tabula Peutingeriana, including Belgium and parts of Gaul. The underlined names are from the corresponding routes in the Itinerarium Antonini.

fact, Ptolemy places the Frisians too far south, practically at the place of the Chamavi, and so it is possible enough that they have displaced the latter towards the east, no matter whether this displacement occurred already in the Prototype Aa, or whether it was due to the Ptol. constructor.

As soon as we assign the Chamai to Prot. Aa, nothing prevents us from regarding Prot. C as owner of the duplicate Kamauoi, and of the entire surrounding milieu. Prot. D, on the other hand, would lose most of its contents, being reduced to the trinity of Swabians, *i.e.* Semnones, Aggeiloi, Laggobardoi.

Considering the two alternatives, we feel obliged to decide in favour of Prot. C, declaring this prototype owner of almost all the displaced Ptolemaic tribes between the Rhine and the Elbe, except the Swabians. Our principal reason is the fact that the correspondence with the Tabula Peutingeriana will only become complete, if we may attribute to C the Kamauoi-Chairusikoi = the Chamavi-Chrepstini Tab. Peuting.

After defining the assumable extension of Prot. C, we shall describe that eastward displacement which forms the principal means of proving

its existence. We need not repeat our observations concerning the displacements in western Gaul, as there is nothing to alter. The modifications concern the surroundings of the Rhine. As we mentioned in our first paper, the Belgian district of Germania C is by the Ptol. constructor mistaken for Germany Aa, the western frontier of that Belgian district being identified with the ancient German frontier river, the Rhine. We still maintain that the middle course of the Rhine C is in return mistaken for the Abnoba Aa. But we withdraw our suggestion that the continuation of the river in C is concealed by the mountain Melibokos and the river Weser. The mountain Melibokos seems to lead us too far south of Askalingion, which marks the place of the Rhenish town Askiburgion or Asberg. And Leufana = Levefano Tab. Peuting., lies at a considerable distance *east* of the Weser, whereas it ought to lie on the *western* border, if this river were to be regarded as the original Rhine of C. As a matter of fact, the Ptolemaic map of Germany seems to contain no physical line which could have been identified with the lower Rhine of C. It is perhaps not excluded that Prot. Aa contained a line representing the frontier of the Roman territory in northern Germany between the years 9 A.D. and 47 A.D. Such a line might have crossed the Weser and touched the Elbe exactly at the places where the Ptolemaic map puts the names Askalingion and Leufana. And the Ptol. constructor would have identified the lower Rhine C with this frontier line of Prot. Aa, whereas the final edition of the atlas eliminated the frontier line, because the Romans had in 47 A.D. given up their dominion over the North German coast.

If the reasons of the displacement on German ground remain somewhat obscure from the physical point of view, its presence is no less certain, as the reader will notice from the following lists of correspondences :—

TAB. PEUTING.

1	2	3	4	5	6	7	8	9	10	11
spingium	Tab[u]lis	Flenio	Fero Adriani	River Arsenes	Mattiacis	Alisincamis	Levefano	Carmone	Asciburgio	Nouesio.

PROT. C.

1	2	3	5	4	7	6	8	9	10	11
skiburgion	Nabalia	Fleum	F. Adrianon	River Amisias	Mariannus	Albis(Samnis)	Leufana	Koinoenon	Askalingion	Nouaisio

ITIN. ANTONINI.

1	2	3
Theudurum	Mediolano	Bagacum.

PROT. C.

2	1	3
Teuderion	Mediolanion	Bogadion

We learn from these lists that the Ptolemaic names of towns and rivers in north-western Germany reappear often as Belgian on the Tabula Peutingeriana or in the Itinerarium Antonini, either with almost identical forms, or under a slight disguise.

The following easily identified towns are localised by the Ptol. con-

structor without any traceable assonances on German ground ; most of the equations have been suggested by C. Müller :—Leufana, Levefano Tab. Peuting., according to C. Müller the present Levenstein ; Askalingion, Asciburgio Tab. Peuting., the present Asberg on the Rhine ; Nouaision, Novesio Tab. Peuting. and Itin., the present Neuss on the Rhine ; Teuderion, Theudurum Itin., the present Tüddern between the Meuse and the Rhine ; Mediolanion, Mediolano Itin., perhaps the present Moyland near Asberg ; Bogadion, Bacaco Tab. Peuting., Bagacum Itin., the present Bavay on the Sambre ;[1] we may add Tekelia, mentioned by no other classical evidences = the present island of Texel.

In the following cases, Belgian names of Prot. C have been absorbed by correctly localised German names of Prot. Aa, owing to treacherous assonances. Although incomplete, the assonances are sufficiently "self-evident" in order to deceive a Ptol. constructor, after all we know about his philological capacity. As a matter of fact the order of names on the Tab. Peuting. corresponds so well to the assonances on the Ptolemaic map that we cannot wonder he was mistaken. Caspingium—perhaps written with indistinct initial—became Askiburgion, now Asberg on the Rhine ; Tabulis, *Nabulis > Nabalia on a homonymous river, mentioned by Tacitus near the Zuider Sea : Flenio > Fleum, on the Vlie Strom ; *F. Adrianum, Fabiranon > Fabaria, a Roman name of the island Borkum ; river Anatius > river Amisias, now Ems ; Albanianis, the present Alfen, near Leyden, misunderstood as *Albis amnis > Albis, the Elbe. We may add Orolaunum, the present Arlon (Flemish Aarlen), west of Luxemburg, misread by the Ptol. constructor as Ar-taunon, and localised near the mountain Taunus.

After the towns and rivers, we shall consider some tribes from the district Germania west of the Rhine, transplanted by the Ptol. constructor to Germany. The Tenkeroi of Prot. Aa seem to have absorbed the *Tungri of C = Tongri of Itin. Antonini. Inkriones, between Rhine and Abnoba, look enigmatic. In the *Scot. Geog. Mag.*, vol. xxx. p. 70, we have suggested an equation with the Belgo-German tribe Eburones, as the termination -ones is very rare among the tribes of Belgium (other instances : Ceutrones, Olibriones).[2] Intouergoi, south of the Inkriones, form another tribe with an extraordinary kind of name. In our above-mentioned research, we have identified them with Strabo's Trevagroi = Treveri, the inhabitants of Trier. But an examination of the Tab. Peuting. supplies a more plausible equation : Intouergoi = Nitiobroges. The latter name is corrupted by the author of the Tab. Peuting. owing to erroneous identification with the well-known Nitiobriges near the Garonne. The second element -obriges Tab. Peuting. seems to be derived from Obringa, the Ptolemaic name of the river Mosel, and the (Niti)obriges thus would be connected with the Ol-ibriones of Jordanis xxxvi. and the Al-obrites or Al-obroges of the anonymous Ravennas, iv. 24 and 26, cf Zeuss, pp. 578, 579. The first syllable

[1] Müller suggests an identification with Burginatium of the Tab. Peuting and Itin. Ant., but the assonance seems too feeble.

[2] The reading Nikriones of one MS. (A) has by some scholars been combined with the Nicretes of a Roman inscription, but it is too isolated.

int = nit would have been more correctly spelt by Ptolemy, and the spelling verg. instead of brig may represent the vulgar Latin pronunciation, cf. Borvetomagus, *Vorbetomagus instead of Borbetomagus, now Worms.

FIG. 3.—The names from Prototype C redistributed on a correct map.

Vargiones south of Intouergoi are, of course, the well-known German tribe Vangiones, correctly localised west of the Rhine on Ptolemy's map of Gaul. Perhaps they are concealed by the badly corrupted name "Rerviges" beside Nitiobroges on the Tab. Peuting.

Karitnoi south of the Vargiones = Parisi Tab. Peuting, erroneously identified with the well-known inhabitants of Paris. They are mentioned

by Cæsar as Caeresi, by Tacitus as Caeracates, and lived in the mediæval district Pagus Caroascus north-west of the Mosel. The derivation has evidently been somewhat fluctuating.

All the mentioned tribes indubitably belong to Prot. C. Continuing farther east, we enter that region which we have in our provisional sketch assigned to D.

The tribes concerned belong to the country east of the Rhine. Kamauoi and Chairusikoi, near Leufana, at the utmost edge of the area with eastward displacement, correspond to the Chamavi and Chrepstini on the Tab. Peuting, not far from Leuefano, at the utmost north-western edge of Germania. The displacement of the Kamauoi is very strong: from the Rhine to the Elbe. The neighbouring tribes Chattai and Tubantoi have equally been transplanted from the Rhenish districts to interior Germany. Kalukones = Kathylkoi Strabo: *Kauklones, or smaller Chauks, occupy both sides of the Elbe, according to Ptolemy's text, although they ought to stand in reality west of the Weser, as their alter-ego does in Prot. Aa.

The presence of a tribe *Angrivarii in C may be conjectured from the absurdly displaced Ptolemaic Sueboi Aggeiloi belonging to Prot. D. It is scarcely conceivable how it could occur to the Ptol. constructor's mind to place the Angles in interior Germany, if he had not been misled by some assonance. The form Angrivarii may have been abbreviated into Angri, so that only the two first syllables were legible. It is not excluded that the corrupted forms "Vapi. varii" on the Tab. Peuting. might conceal the name of the same tribe. The Brukteroi may also have occurred in C, corresponding to the Burcturi on the Tab. Peuting. If so, the "smaller Brukteroi" near the Rhine were really meant, whereas the Ptol. constructor identified them with the "greater Brukteroi" of Prot. Aa farther east.

Next to the Brukteroi, we notice the Kasvaroi and the *Chattvaroi (Chaitvoroi), two tribes that ought to stand near the lower Rhine. The Ptol. constructor has transplanted them east of the Abnoba. Finally, the Uispoi follow, = Usipi. This is the only one of the displaced tribes that has retained its position near the Rhine. In return it has been pushed far south from the region north of Mayence to the slopes of the Schwarzwald.

Taking the above-mentioned extension of Prot. C for granted, we may sum up its relations to the other prototypes in the following manner:—

Prot. C covers the entire German area of Aa, and nearly the entire area of Ab. In Aa the Cimbric Chersonese remains free from invasion, and in Ab a narrow strip south of the mountain Albia. The eastern extremities of C are intermixed with Prot. B2; here the eastward displacement collides with the westward—*e.g.* the Kamauoi and Tubantoi from the Rhine shake hands with the Siliggai from Silesia and with the inhabitants of Kalisz in Poland. The displaced Swabian tribes of D penetrate the German area of C as a narrow wedge from the Elbe to the Rhine.

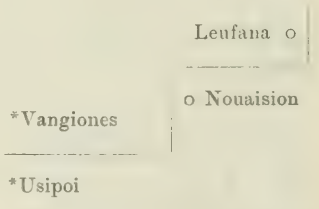
b. *Topographic Correctness.*

As we shall see under the heading "Literary milieu," Prot. C was a so-called itinerary, *i.e.* a road-map showing the distances between a series of towns. Such maps, like our modern schematic representations of railway systems, do not pretend to offer a correct topography. The Tab. Peutingeriana is a classical example of the prevailing distortions. Correspondingly, there are several traces of bad topography in Prot. C.

The tribes are distributed in a confused manner, as in the Tab. Peuting. (1) Abrinkatuoi, (3) Namnetai, (2) Redones, instead of 1, 2, 3; Karitnoi south of Vangiones, *Chattvaroi south of Kasvaroi, Kamauoi beside Chairusikoi and Chattai, cf. the Chamavi beside the Chrepstini on the Tab. Peuting. The distance between Nouaision and Bogadion (Bagacum) is shortened. On the other hand, the distance between Mediolanion and Leufana is largely exaggerated. *Bagacum ought to lie south-west of Nouaision, not north-west.

It must, however, be remembered that the Ptol. constructor may have deteriorated the map, as he seems to have done by introducing the broad chasm between the sections north-western Gaul and Germania Belgica.

In spite of the confusion, parts of the map seem to have been not so bad after all. The line *Vangiones, *Arlaunon, *Tungri (Tenkeroi), Nouaision, Teuderion corresponds fairly well to the actual positions of Worms (capital of the Vangiones), Arlon, Tongern, Neuss, Tüddern. It seems that Prot. C had not yet assumed the extremely oblong shape which deforms the Tabula Peutingeriana. The Rhine was most likely represented on the basis of observation of its various curves, and not as a smooth line, as was the case on the Tab. Peuting. and in Prot. A. A zigzag line is implied by the localisations of the fixed points indicated in the accompanying diagram. It corresponds to two actual curves of the river, the one between Strassburg and Bingen, the other between Neuss and Nimwegen.



c. *Statistical Features.*

Prot. C, like the Tabula Peutingeriana, contains mainly towns, but also several tribes. In the invaded north-western German section of Prot. Aa, Prot. C thus "supplies a want," as these regions were in reality almost completely bare of towns.

On the other hand, Prot. C enriches south-western Germany with a series of tribe names, whereas the due local Prototype Ab contains no samples of this category. The present selection of names in Prot. C seems somewhat accidental or arbitrary, but this fact may to a great extent be due to the Ptol. constructor. It is worth noticing that all traceable towns of Prot. C in the western section possess a certain importance, three being tribal capitals, and the fourth a flourishing mercantile centre, the present Rouen. On the Tabula Peutingeriana two of these are distinguished by towers, viz. Rouen and Rennes.

As to the names of tribes, the selection may have been somewhat arbitrary from the very beginning. We shall see later on that it is reproduced nearly unaltered by the Tabula Peutingeriana. But Prot. C at least in some points is more complete than both the Tab. Peuting. and the Itinerarium Antonini. The *Vangiones, Abrinkatuoi, Redones, Morinoi of C are missed in both of the latter documents. And, if we are right in assigning to C the Kamauoi and their surroundings, the prototype would have contained a fairly copious representation of tribes in western Germany, whereas the selection of the Tab. Peuting. is more fragmentary, and no German tribes occur in the parts concerned of the Itin. Anton.

d. *Occurrence of Duplicates.*

The distribution of duplicates has been somewhat altered, owing to the modification of our theory. We now assume the following series: Namnetai C = Samnitai A, Ratomagos C and A, roMorinoi C = Morinoi A (not in all MS. atlases), Vargiones C = Vaggiones A, Askalingion C = Askiburgion A, Kamauoi C = Chaimai A. The two Marionis can no longer be regarded as authentic duplicates, as the one belonging to C is rather a distortion of Matilone on the Tab. Peutingeriana. We have withdrawn the identification of Intouergoi C and Triberoi A (Trevagroi Strabo), preferring the combination with the Nitiobroges of the Tab. Peuting. Also the equation Feugaron C = Tungroi A seems too questionable.

e. *Linguistic Marks.*

In this *Magazine*, xxx. p. 71, we pointed out Latin residuals in Prot. C, such as the *nk*, *ng* in Kondeouinkon, Ingena, Abrinkatuoi, Askalingion. It may be added that Leufan*a* points towards the vulgar Latin form Leuefan*o*, Tab. Peuting.; a Greek MS. would scarcely have dropped the final nasal as early as the second century A.D. Our new conjecture Albanianis, Tab. Peuting. = *Albis amnis, Prot. C, suggests that the prototype would have been read and interpreted in Latin. Also the equation F-abiranon = Foro Adriani, Tab. Peuting. seems to point towards Latin types.

f. *Literary Milieu.*

Prot. C is most closely related with the Tabula Peutingeriana, but has also special affinities with the Itinerarium Antonini.

1. *Common Affinities.*
   Towns: Kondate, Ratomagos, *Bagakon, Koinoenon (Caruone), Nouaision.
2. *Affinities with the Tabula Peutingeriana.*
   Tribes: Namnetai, Intouergoi, Vargiones??, Karitnoi, Brukteroi?, Kamauoi, Chairusikoi (Kasvaroi?).
   River: Amisias (for Anatius).
   Towns: Askiburgion (for cAspingium), Nabalia, Fleum, F-abiranon, Matilone, Albis, Leufana, Askalingion.
3. *Affinities with the Itinerarium Antonini.*
   Tribal district: Germania. Tribe: *Tenkeroi (= Tongri).
   Towns: Mediolanion, Teuderion, Arlaunon.

We have mentioned above that two of four Gallic towns in C have

vignettes with towers on the Tab. Peuting.—a circumstance which points towards statistical parallelism. We have likewise mentioned the close correspondence between the tribal names of Prot. C and those of Tab. Peuting. As a matter of fact, the Tab. Peuting. north of the river Loire contains nearly no additions to the stock of Prot. C. We notice only Veneti, Osismi, Franci; the last-mentioned name must be regarded as added after Ptolemy's times.

As conclusion of our observations we may say that Prot. C adds scarcely anything to the already known descriptions of Gaul, Belgium, and western Germany. Its most individual characteristic is the name Tekelia = the present Texel. But the prototype has of course a certain literary interest, as it helps to illustrate the genesis of the Tabula Peutingeriana and the Itinerarium Antonini.

THE CAPTURE OF THE GELDIE BY THE FESHIE.

By Alex. Bremner, D.Sc.

(With Illustrations.)

Since the appearance of Mr. Hinxman's paper on the Spey in the *Scottish Geographical Magazine* (1902), the transference of the head-waters of the Geldie to the neighbouring Feshie has frequently been instanced as a typical case of recent river capture. That the latter river has gained at the expense of the former is an inference readily drawn from examination of maps alone; but a study of large-scale maps, and still more a survey of the ground around the elbow of capture, lead one to doubt whether this be really such a case of capture as one might use to demonstrate to the lay mind that most interesting physiographical process. Above all one is constrained to doubt whether it be so recent as Mr. Hinxman holds. "The fact that the valley at the head of the Geldie is filled with drift, while below the bend the Feshie is rapidly eroding its channel through the quartzose flagstones of the Moine Series, shows that *the capture of the waters of the Geldie took place in post-glacial times.*"[1]

Whether river capture has occurred through erosion of drift or through erosion of solid rock, theory demands that, before it can be claimed as recent, the following conditions must be satisfied:—

1. Just below and just above the elbow the capturing and captured streams flow in a steep-sided trench or gorge: and the elbow of capture itself is sunk below the head of the valley of the beheaded stream.

2. The watershed near the elbow crosses the floor of the beheaded valley, and the latter at first ends in the air on the brink of the young gorge.

3. The gradient of the valley above the elbow (apart from the local

[1] *Memoirs of Geological Survey*, "Geology of Upper Strathspey" (Explanation of Sheet 64), p. 7.

gorge) should merge without break into that of the beheaded valley below the elbow.

Where the Feshie wheels from east-north-east to north-north-west, the outer, right, or east bank is eight feet in height; and its top is not more than a foot or two below the nearest point on the peat-covered watershed, which lies not many yards distant. For more than half a mile below the bend the river has spread out an alluvial flat of some width: precisely at the bend it has been cutting outward as well as downward, for on the inner, concave side the low scarp of an amphitheatre terrace rises above the present flood plain.

Hence, though at the elbow the Feshie flows a matter of 10 feet below the watershed, neither there nor for a considerable distance down-stream has it formed what can be called a gorge: the same is true of the river above the elbow. Yet the facts stated, taken alone, might be held to prove the capture to be of quite recent date—a date so recent that sufficient time has not elapsed for the development of a gorge—and to satisfy the former part of the first condition. Because of the small amount of vertical erosion effected by the Feshie at the elbow it may be claimed that the history of the river has but recently passed the stage when its waters were divided, part going east to the Geldie, part north north-west to join the Eidart. Vital objections to this claim are (1) that no abandoned stream track can be traced immediately to the east of the elbow; and (2) that there is no evidence of a greater volume of water having recently passed down the upper Geldie valley than now does so.

At and for a short distance below the elbow the channel and alluvial flats of the Feshie have been incised on a nearly flat platform of glacial debris[1] raised 20 feet above the western extremity of the Geldie valley. The relations in level of the two streams at this point are shown in Fig. 1. For some miles below its head the floor of the Geldie valley has a gradient of under 30 feet per mile: the short slope leading up to the platform has a gradient markedly greater, so that, viewed from some distance to the east, the platform seems to cross the head of the valley like an artificial embankment.

Now the platform is, as far as can be judged, composed of loose materials.[2] From its position it should, on Mr. Hinxman's theory, have formed part of the valley floor of the unbeheaded stream. Taking into consideration the composition of the platform, it seems impossible for any one to suppose that a stream of the volume of the Feshie-Geldie should not have had here practically the same gradient as in that part of its course immediately to the east—if the gradient there be due to river erosion alone, which is questionable—or that it should not have

[1] Mr. Hinxman's statement that "below the bend the Feshie is rapidly eroding its channel through the quartzose flagstones of the Moine Series" requires some qualification. "Below the bend" means "below the bend, beginning fully half a mile down."

[2] Called by Mr. Hinxman "drift" (Explanation of Sheet 64, p. 7); by Mr. Barrow "alluvium" (*ibid.*, p. 109); by Mr. Cunningham-Craig "alluvium," but described by him under the heading "Fluvio-glacial Sands and Gravels" (*ibid.*, p. 100); and labelled as "alluvium" on the published map.

at least smoothed out the gradient on the platform (*a* to *b*, Fig. 1) and platform slope (*b* to *c*, Fig. 1). The existence of the platform is not to be explained by any sort of river action.

It is clear, therefore, that the latter part of the first condition is not satisfied: at the elbow of capture the Feshie is not sunk below the valley floor of the beheaded stream (Fig. 1). It is equally clear that the second condition is not satisfied, for the watershed lies on a platform that breaks the continuity of the old valley floor. The beheaded valley does not end in the air, but is buried, so to speak, under an accumulation neither formed nor fashioned by the Feshie-Geldie.

The gradient of the upper part of the Geldie valley is, as has been stated, less than 30 feet per mile: that of the Feshie valley for about a mile above the elbow is nearly 130 feet per mile (though further up it falls off considerably). There is nothing in the structure of the ground to account for these strange variations; and it is evident that, instead of the gradient above the elbow[1] passing insensibly into that below it, there is a sudden break in the profile of the dismembered stream.

FIG. 1.—Section across the barrier at the head of the Geldie valley.
Horizontal Scale, 2 inches=1 mile.

Indeed, if we think of the platform as forming part of the valley floor before capture was effected (as we are bound to do if we follow Mr. Hinxman), there are in the vicinity of the elbow three inexplicable breaks—at *a*, *b*, and *c* (Fig. 1).

Thus it appears that the third condition is not satisfied any more than the other two, and the case for capture by normal headward erosion in post-glacial times falls to the ground.

Since the theory of post-glacial capture proves on examination to be unsatisfactory, a theory may be put forward that seems to explain the peculiar phenomena in the vicinity of the elbow.

A great spread of moraine stuff extends westward from three miles below the bend and cloaks both sides of the Feshie valley to beyond the mouth of the Eidart. To the north of the Geldie it forms a rude, hummocky-topped terrace, presenting a rather steep slope, furrowed by the run-off of rain water, towards the peculiar flats that border the river: on the south side of these flats only boulder clay is seen. This terrace looks like the terminal moraine of glaciers descending in

[1] No complication arises from the presence above the elbow of a recent gorge incised on the bottom of an old valley.

late glacial times from the corries of Carn an Fhidhleir (Carn Ealar) and An Sgarsoch.

The platform or barrier that turns the Feshie to north-north-west forms part of this great accumulation of moraine: it is certainly not alluvium. The section disclosed in the low bluff on the outside of the great bend of the Feshie shows only the rudest stratification; and there are stones of all sizes, rounded and unrounded, many of which cannot possibly be water-borne: some of them weigh from two to three tons.

While the present upper Geldie valley was occupied by glacier ice, an overflow of meltwater[1] was directed across, and cut a channel in, the morainic deposits between the elbow and the mouth of the Eidart.[2]

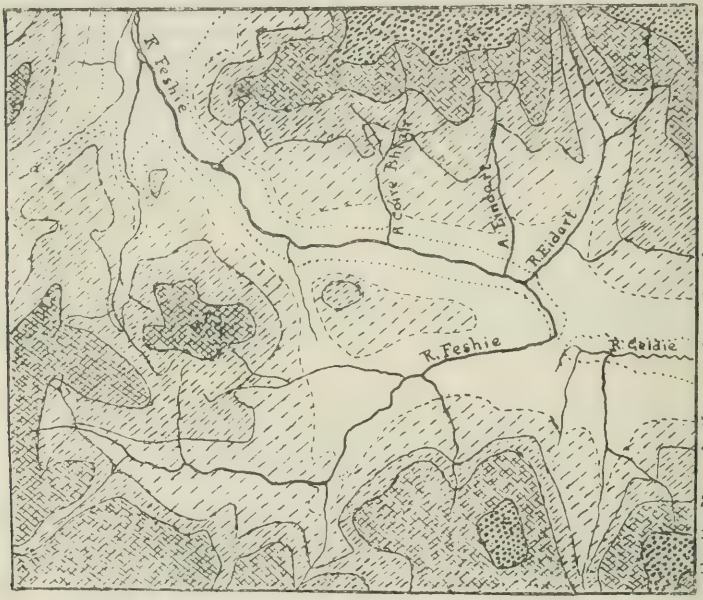


FIG. 2.—Relations of the Geldie and Feshie basins as they are now.
Scale, ½ inch=1 mile.

The top of the platform, which is some 30 feet below the moraine on either side, shows the final level of the "intake" of the overflow, *i.e.* the level to which the meltwater where it left the ice-front managed to cut down—and top-dress—the morainic deposits. Traces of stream (fluvio-glacial) erosion are seen on the bank of moraine stuff bordering the right side of the valley below the elbow and at a level considerably above that of the platform and watershed. The direction of the overflow would be determined by the relative ice-levels in the present upper Geldie valley and in the valley of the Feshie below the mouth of the Eidart. The floor of that portion of the overflow channel unaffected by

[1] Explanation of Sheet 64, p. 100.

[2] If, while ice blocked the Geldie valley, meltwater followed the line of the upper Feshie it, too, may have shared in eroding the morainic deposits.

post-glacial river erosion slopes towards the north-north-west, and hence we conclude that the meltwater passed in that direction.

The present upper Feshie occupied the channel thus excavated, and during its occupation has done remarkably little to deepen or otherwise modify it, though a *portion* of the fluvio-glacial deposits on its floor has been worked over so as to form a narrow flood plain. The small amount of vertical erosion is explained by the fact that the river is here practically at local base level—a base level determined by the rock-bar encountered half a mile below the elbow: the valley floor was graded down nearly to its present slope by the action of the overflow.

Though at one point a quarter of a mile from the elbow the river

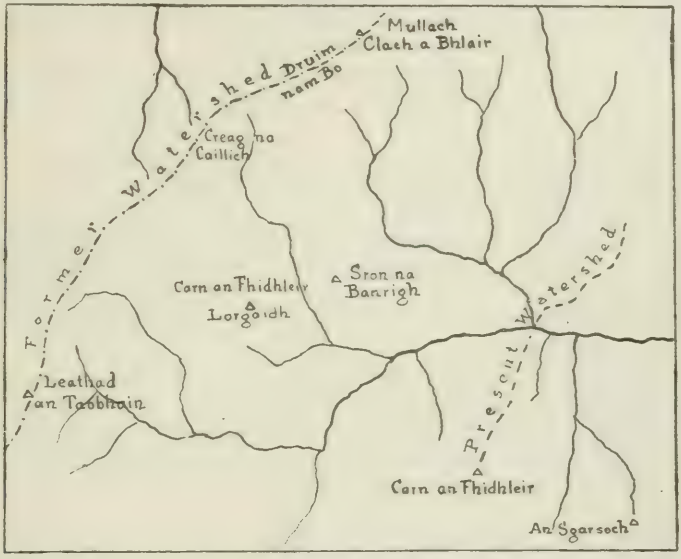


FIG. 3.—Relations of the Geldie and Feshie basins as they once were.
Scale, ½ inch = 1 mile.

touches rock on its left bank, rock first crosses the bed of the Feshie below the elbow at a level of 1705-1710 feet, *i.e.* 40-45 feet below the watershed on the barrier or platform; and there, and till the mouth of the Eidart is passed, it appears only in or quite close to the stream. Judging by the levels of the outcrops of solid rock, one is safe to say that, though the overflow had never touched rock at all, the drainage would pass as it now does. In other words, *present conditions were established on a terrain of glacial deposits.* The process, moreover, was not river capture, but *river diversion.* The upper Feshie was restrained from passing eastward by the barrier of moraine stuff at the head of the Geldie valley, or by the ice behind it, or by both; and, finding ready outlet by way of the overflow channel, took its course towards the north-north-west. Consequently diversion—it cannot be called capture—was not post-glacial in date but *late glacial.*

The moraine stuff, by erosion of which diversion was effected, covers the bottom and lower slopes of a very wide, rock-bound hollow. Within this hollow we find no remnant of any ridge of rock that might have formed the pre-glacial watershed between Feshie and Geldie, and are constrained to inquire what conditions of drainage prevailed just before the Ice Age. Was the Geldie tapped by the Feshie in pre-glacial times? And did the glacial deposits in the track of the overflow choke up a valley below the elbow cut in solid rock by the capturing stream?

The basin of the Feshie above Creag na Caillich has, it seems to me, been annexed from that of the Geldie by a long-continued series of captures. The early—or *an* early—pre-glacial Geldie-Feshie watershed probably curved round from Mullach Clach a Bhlair by Druim nam Bo and Creag na Caillich to Leathad an Taobhain (Fig. 3). Present conditions of drainage have been brought about mainly by—

(1) The tapping and inversion of a stream flowing south-east from near Druim nam Bo between Sron na Banrigh and Carn an Fhidhleir Lorgaidh to join the Geldie;

(2) The successive tapping and partial inversion of the Allt Coire Bhlair, the Allt Eindart and the Eidart; and, lastly,

(3) The tapping of the Geldie.

Absolute proof of these changes, all of them pre-glacial, there cannot of course be; but the probability of their occurrence is suggested, for example, by the 2000 feet contours, which diverge in a remarkable manner in the direction taken by the supposed primitive drainage, *i.e.* Geldie-wards (Fig. 2).

The head of the present Geldie valley marks the position of the former junction of the Eidart and Geldie. The valley between that point and the mouth of the Eidart widens markedly—more markedly than the run of the 1750 feet contour shows—to the south-south-east; and the explanation appears to be that the Eidart once drained in that direction.

The Eidart was captured by the Feshie, and an inverted stream, working along the deserted valley of the former, tapped the main stream of the Geldie, the elbow of capture then presenting the normal features —rock gorge above and below the elbow, etc. Part of the rock gorge, too, was incised on the bottom of a wide, old valley—that of the lower Eidart—which sloped towards the Geldie and widened out in the same direction, as it still does.

During the Ice Age glacial erosion partially obliterated features that should have presented decisive proof of normal capture; we cannot, for example, now trace the gorge-within-valley which formerly characterised that portion of the diverting stream between the elbow and the Eidart.

That glacial erosion has been potent in this quarter is shown by the marked increase in the gradient of the Feshie where it descends to the elbow[1] (p. 591), and by the remarkably low gradient of the upper Geldie

[1] The steep fall of the Feshie just above the elbow at once strikes the pedestrian coming from the east up the Geldie valley.

valley. Glacial erosion may have been active in the Geldie valley all through the Ice Age—during the maximum glaciation, during the period of valley glaciers and confluent ice-sheets, and down to the time when moraines were being deposited along the north side of the valley. The abnormal gradients above noted can only be explained by glacial deepening about and below the elbow. On the Feshie-Geldie,[1] an old-established river flowing over rocks comparatively homogeneous, there could have been no such pronounced irregularities of gradient as now exist.

Had erosion been the only process in operation during the Ice Age it is difficult to say what the post-glacial course of the upper Feshie would have been on the disappearance of the ice: for we know nothing by direct observation of the present contours of the rock-floor[2] in the immediate neighbourhood of the elbow. It is probable, indeed, that the

FIG. 4.—The Elbow of the Feshie.

The watershed crosses the right foreground. Glen Eidart is seen in the centre of the sketch and forms the great gash in the sky-line. The level sky-line is part of the southern edge of the great Cairngorm plateau.

Geldie would have regained its lost headwaters. Other forms of ice action, however, were the decisive factors in determining, as already described, the post-glacial drainage.

Had the Eidart not formerly flowed south-south-east to join the Geldie we should not now have below the elbow a valley widening in a direction contrary to the flow of the stream occupying it. Had there been no pre-glacial capture, and, above all, had the Eidart not formerly taken the course described, we should have expected to find a rock gorge,

[1] Near its mouth the present Geldie has a steep gradient, the fall being 237 feet in 2¼ miles. This is due to glacial deepening of the valley into which it falls, that followed by the Tarff before it was tapped by the Tilt.

[2] Cf. p. 593; the rock mentioned there as crossing the bed of the Feshie at 1705-1710 feet lies as stated half a mile below the elbow. No rock is seen in the bed of the Geldie for over 3½ miles to the east of the watershed and more than 100 feet below it.

excavated by the overflow, cutting across the pre-glacial watershed.[1]

It has been shown that, in the case under consideration, we are not dealing with normal capture in post-glacial times; that present conditions are best explained on the assumption of pre-glacial capture followed by glacial erosion; that the effect of glacial erosion alone would probably have been the restoration to the Geldie of its lost headwaters; that this was prevented by a combination of deposition and fluvio-glacial erosion in late glacial times.

PROCEEDINGS OF THE ROYAL SCOTTISH GEOGRAPHICAL SOCIETY.

Lectures in November.

The Inaugural Address will be delivered by Dr. J. Scott Keltie, F.R.G.S., F.S.S., F.S.A.Scot., late Secretary to the Royal Geographical Society, in Edinburgh on the 18th inst. The subject of his address will be "The Progress of Geography during the last Half-Century." The address will also be given before the Dundee and Glasgow centres on the 17th and 19th respectively. Miss Ruth Raeburn will deliver the opening lecture at Aberdeen on the 17th inst. The title of her address will be "Glimpses of Serbian Life before the War."

GEOGRAPHICAL NOTES.

Europe.

Maps of River Basins in England and Wales.—We have received the following intimation from Mr. W. P. Reeves, Director of the London School of Economics and Political Science:—

"I have pleasure in informing you that the Right Hon. Sir John Brunner, Bart., has been good enough to deposit in the British Library of Political Science, a volume of 'Maps of River Basins in England and Wales, in county groups, defining the possible jurisdiction of joint committees of county councils for the prevention of pollution of rivers under section 14 of the Local Government Act, 1888, and other matters requiring joint control.' The maps show rivers, water partings, political boundaries, and county boroughs, rivers pollution, waste lands, corn 1869 and 1891, and population 1891, and were prepared for Sir John Brunner, in 1893, by Mr. C. E. de Rance, of the Geological Survey, Secretary of the Underground Water Committee of the British Association. The maps are all on a scale of about sixteen miles to an inch, and should prove of much value to members and officials of municipal authorities, and to all others interested in the question of river pollution

[1] Most, if not all, known cases of river diversion brought about *solely* by the action of glacial overflows, exhibit this common feature.

and its allied topics. The library is open from 10 A.M. to 6 P.M.; during term to 9 P.M. (Saturdays 1 P.M.). The maps will be available for examination at any time when the library is open."

Sudden Formation of Swallow-hole in a Limestone District.—It is a familiar fact that in limestone regions, owing to subterranean erosion, the structures called sinks or swallow-holes in this country, and dolines in parts of the Continent are common. From the nature of the case, however, it is unusual for the actual process of formation to be observed by man. This gives special interest to a case in Italy, in the province of Rome, where in the early part of the present year a considerable doline suddenly made its appearance. The phenomenon took place near the village of Montecelio, and has been described by an engineer, Mr. C. Crema, who visited the spot some days after the occurrence, and collected information from eyewitnesses. His paper appears in the *Boll. Soc. Geol. Ital.*, xxxiv., and is summarised in the *Rivista Geografica Italiana* for July last.

When Mr. Crema saw the doline it had the customary elliptical shape, the greater diameter being about 60 metres and the lesser 55. The depth was 30 metres. The sinking took place on March 16 without any premonitory symptoms, and was accompanied by the discharge of a thick cloud of white dust, mistaken at first sight for an outburst of water. In a part of the village a great noise was heard and the houses shook as if under the influence of an earthquake shock, so that many of the inhabitants rushed out of their dwellings. In other parts of the village no trembling was felt and the noise was scarcely audible. In neighbouring villages no phenomena of any kind were perceptible. When first formed the cavity was perfectly circular, its walls perpendicular or even overhanging, and the bottom devoid of water. Successive falls destroyed the vertical walls and enlarged the cavity. The walls soon become covered with an incrustation of red earth brought by flowing water, but there seems no reasonable doubt that the original cavity was formed in the limestone rocks which are abundant in the locality.

Asia.

The Forests of the Philippines.—According to a note in *Nature* there has appeared recently in the *Philippine Journal of Science* an elaborate article on the Dipterocarp forests of these islands. The Dipterocarps are a family of Dicotyledons, peculiar to the Indo-Malayan region, where they tend to form forests at low elevations. In the Philippines they cover an area of 30,000 square miles, and extend from sea-level to an elevation of 2500 feet. The most interesting feature in regard to these forests is that, in contrast to the general rule as regards tropical woods, they form almost pure stands of a few species. In general one great obstacle to the utilisation of tropical forest is the multiplicity of species and genera, which renders wholesale methods of exploitation inapplicable. According to the authors of the paper, Messrs. Brown and

Mathews, the trees of the Philippine forests are capable of yielding enormous supplies of soft and light timbers, as suitable for building purposes as the pine and spruce of the north, and the use of American machinery has rendered possible the establishment of an export trade from Philippine ports in such timber. It is believed that artificial replanting is not possible, but that suitable methods of felling will result in natural regeneration.

Expedition to the Yenesei Region.—We noted here in vol. xxx. p. 543 the departure of an anthropological expedition to Siberia last year, under the leadership of Miss M. A. Czaplicka. According to a note in *Nature* for September 16 the party returned home early in September after a very successful expedition. The journey was made from Warsaw to Krasniack, and thence to the mouth of the Yenesei. The first tribe studied was that of the Samoyeds, and the winter was then spent among the Tungus of the tundra, a very primitive race, little influenced by Russian culture. The spring was devoted to the Tartars, who are much more civilised than either the Samoyeds or the Tungus. Much information of scientific interest has been obtained, and a large collection of costumes, weapons, implements, and ornaments made of copper and iron got together. This collection will, it is hoped, be exhibited in Europe and America after the close of the war.

Exploration in Central Asia.—From a communication from Sir Aurel Stein, dated July 10, 1915, which is published in the *Geographical Journal* for October, it appears that the explorer carried out his intention of wintering in the Turfan district (cf. p. 270), which was reached in the beginning of November 1914. Bahadur Lal Singh set out to do survey work in the Kuruk-tagh shortly after the arrival of the party, and Sir Aurel Stein, with two assistants, proceeded to study archæological sites in the vicinity of the Turfan basin. Here extensive excavations were undertaken, with the result that many fine fresco paintings, also texts, coins, implements, etc., were discovered, the investigation of an ancient burial ground near the village of Astana being especially productive. In the middle of February, after all the finds had been packed up and despatched, the explorer himself set out for the Kuruk-tagh, where some further exploration was undertaken. Subsequently the leader and the surveying parties all met at the oasis of Korla, Lal Singh having succeeded in linking the Tian-shan range with the system of the Trigonometrical Survey of India. From here the expedition started in three separate parties for Kashgar, where Sir Aurel Stein arrived at the end of May last. While there he obtained permission from the Russian Government to travel in Russian Turkestan across the Pamirs, and through the mountain tracts north of the Oxus, and set out for this purpose at the beginning of July. From there he proposed to make his way by an interesting route to Bokhara, and afterwards to cross into Persia, with the intention of reaching Meshed about the end of October. The winter he proposes to devote to researches in Seistan, returning to India in the spring.

Africa.

The Ituri Forest Region and its Pygmies.—Dr. Cuthbert Christy gives in the September number of the *Geographical Journal* an interesting account of travels in the equatorial rain forest lying south of the Ituri river, where he spent a considerable time in 1912-13, while engaged in the collection of natural history specimens. He entered the region by the Congo, and during his journey from Stanleyville to Avakubi came on a group of forest natives on a hunting trip, remarkable for the curious fashion in which their bodies were marked. "One little old man had inch-wide strips of white diagonally across his face, body and limbs. Others were marked with red much in the same way, while some had a broad white or dull red stripe down the outside of each arm and leg and across the face, with nothing on the body." The object of the colouring is, of course, to break up the outline and make the body less conspicuous in the lights and shadows of the underwood, but the interesting point is that, according to Dr. Christy, the device is so successful that in sunlight the duikerboks of the forest are completely deceived, and will run past the motionless hunter without perceiving him, and are then caught by the aid of nets. The observation has a twofold interest. In the first place, it confirms the view that the bands and splashes of colour of many wild animals have a protective value, and second, it shows that this savage people have long practised a device said to be coming into wide use during the present war for the concealment of guns, etc.

The paper is, however, especially devoted to the true forest pygmies of the Congo, of whom the author gives an attractive account. He had at first some difficulty in coming to close quarters with them, but later they became exceedingly friendly, and Dr. Christy frequently tracked game in the forest in their company. Salt seems to be the article most desired, together with iron for spears, knives, arrows, etc. The pygmies' power of tracking appears to be very great, and they hunt okapi, elephant, the forest pig, and the dwarf buffalo. Meat of any sort is eaten either raw or toasted. Monkeys, which are shot with poisoned arrows, are perhaps the favourite food, but roots, fruits, berries, mushrooms, honey, and so on, are eagerly consumed. It is unusual for a company to spend more than three or four months in one locality, and they regard the forest as entirely their own property. Dr. Christy gives an interesting account of the ascendency which the pygmy boys, despite their size, obtain over the boys belonging to the tribes living on the outskirts of the forest, with whom they often play. The poisoned arrows of the pygmies are apparently much dreaded. At the same time there is a considerable amount of intercourse between the pygmies and the other tribes, for the former are very fond of bananas, sweet potatoes and so on, which they obtain in exchange for meat and ivory.

Two other points in an interesting article may be mentioned. Near the Semliki river there is a dry belt with thin forest consisting of small-leaved trees, which abuts upon the true rain-forest to the west. Here

and there towards the margin of the rain-forest occurs a species of cicada whose "voice" is so loud and continuous as to produce deafness. The insect itself was not seen, and was declared by the porters to be never visible, but it was found that the stretches of forest inhabited by the insects were devoid of animal life, apparently owing to the intolerable noise.

The second point relates to the remarkable native system of "telegraphing" by drum taps. On one occasion a message was sent in this way from one village to another two miles away, but by a system of relays news can be disseminated with great rapidity over considerable distances.

America.

Physiographic Boundaries in the United States.—Under this title Mr. N. M. Fenneman discusses in a lengthy article in the *Annals* of the Association of American Geographers, IV., the natural provinces of the United States and their boundaries. The divisions adopted are those suggested by Powell, with some modifications, and are based upon topography and soil, not upon climate or vegetation. Owing to the fact that in the States it frequently happens that topographic contrasts are associated with a difference in the geological age of the underlying rocks, the province boundaries frequently, though not invariably, are drawn along geological contacts. The following brief summary of Mr. Fenneman's paper should be studied with the help of a good physical map.

(1) The Atlantic and Gulf Coastal Plain may be defined briefly as that part of the continental shelf which has been raised above water without deformation. Its boundaries, broadly speaking, lie along the line of contact between the Cretaceous and younger rocks on the one hand and the Triassic and older rocks on the other. Its natural subdivisions are the alluvial plain of the Mississippi and the parts of the coastal plain lying respectively east and west of this. Inland from the Atlantic Coast Plain lies (2) the Piedmont Plateau, the term being restricted to the part lying west and south of Hudson River. Much of the Piedmont consists of Triassic rocks, and its western boundary is defined as the region where the plateau topography gives place to the mountain type. Thus it here abuts upon (3) the province of the Blue Ridge and Southern Appalachians, where the rocks are chiefly hard beds of Pre-Cambrian and Cambrian age. Westward of this belt we come to (4) the Appalachian Valley and Ridges, where the characteristic topography is one of parallel longitudinal valleys and mountain ridges made by erosion in the second cycle after folding. To the north-east the Appalachian valley is continuous with that of the Hudson, but the somewhat different geological history of the latter makes it desirable to separate it from the province. West of the Appalachian valley comes (5) the Allegheny-Cumberland Plateau, a dissected region of considerable mean elevation, in which the beds lie almost horizontally. The rocks are chiefly, but not exclusively, of Upper Carboniferous age. In its more

southerly part this region abuts to the west on (6) the Interior Low Plateau, where the rocks are older than Carboniferous. To the north-east the Allegheny-Cumberland Plateau abuts upon (7) the New England Region, which, though in a sense continuous with the Appalachian belt, yet differs sufficiently to make its recognition as a separate region desirable. West of this New England Region lies (8) the Lake Region, whose special feature is that its present topography is due to recent glaciation; it is further characterised, in contrast to the prairie to the west, by its forest cover.

South of the Lake Region, and west of the northern part of the Allegheny-Cumberland Plateau, lies a vast irregularly shaped region in the central United States, forming (9) the Central Low Plains. This great area can be subdivided into several minor regions, but its essential features are the level surface and the slight elevation. To the south-west it is separated from the Gulf Coastal Plain by (10) the Ozark-Ouachita Region, a plateau and mountain region surrounded by plains. Westward it abuts upon the great sloping plateau known as (11) the Great Plains, a region as distinct from the Low Plains to the east owing to its height above base-level, as from the mountains to the west owing to its form. To the south Mr. Fenneman recognises as a separate province, under the name of (12) Central Texas Hill Country, the dissected and partly denuded tract which rises in the middle of Texas State. Westward the surface of the Great Plains is continued across a plateau belt into (13) the Colorado Plateau, thus rendering it necessary to recognise (14) a Central Rocky Mountain Basin region, as separating the province of (15) the Northern and Western Rocky Mountains from that of (16) the Southern Rocky Mountains. The Central Rocky Mountain Basin is not everywhere well demarcated from (17) the Colorado Plateau, whose special feature is that it consists of elevated, horizontal, well indurated strata, locally covered by lava flows. West and south of the Colorado Plateau lies a vast area characterised by isolated, nearly parallel mountain ranges, with intervening plains made in the main by deposits of waste from the mountains. To the whole region the name of (18) Desert Plateaus may be given, though the northern half is generally known as the Great Basin. To the north of the Great Basin lies (19) the Columbia Plateau, lying within the drainage basin of the Columbia River. West of the great belt of plateaus just described lie the mountains and valleys which stretch along the Pacific coast. These may be divided into the following three provinces:—(20) The Cascade Mountains and Sierra Nevada; (21) The Coast Ranges; (22) The Pacific Coast Valleys.

Resources of British Guiana.—Professor J. B. Harrison and Mr. C. K. Bancroft publish in the *Bulletin* of the Imperial Institute (vol. xiii. 2) a comprehensive article on this subject. Both as regards climate and soils the colony may be divided into three belts:—(1) the coastal region; (2) the forest belt, comprising the lower hills and inland plains; (3) the savannas of the far interior. In the coastal region the soil is alluvial and singularly rich, so that the region is well suited to

many forms of tropical agriculture. The possible number of plants which can be grown here is only limited by the distribution of the rainfall, which is not favourable to, *e.g.*, cotton, owing to the small precipitation during the months from August to November. The forest belt has no distinct dry season, but the soils, chiefly sands and clays, are less fertile, and are for the most part sedentary, that is derived from the underlying rocks. In the savannas there is a long dry season, extending from November to March. The region is at present practically undeveloped, but seems to be well adapted for cattle-rearing, while there are belts of alluvial and fluviatile soils within it which could be used for many tropical products.

Owing to transport difficulties it is chiefly the coastal belt which is at present undergoing commercial development. Sugar, as is well known, is here by far the most important crop, and, as is generally the case in tropical countries, it is only cultivated by large capitalists or companies. The labour employed is chiefly East Indians with negroes and some aborigines. The area under sugar could be very largely increased, as it no doubt will be if present prices continue. There has been a curious change of recent years in the destiny of the product, for while in the nineties the United Kingdom took 75 per cent. of the total, and nearly the whole of the remainder went to the United States, in 1912 and 1913 70 per cent. of the total went to Canada, 20 per cent. to the United Kingdom, and only about 8 per cent. to the States. In addition to sugar, rum and molascuit (a cattle food) are important products of the sugar-cane industry.

A rather interesting secondary effect of the immigration of East Indian settlers and indentured labourers has been a rapid increase in rice production in the colony. In contrast to sugar, rice is a small farmer's crop, and is produced, both by East Indians and by negroes, by very primitive methods, with a maximum of hand labour. The increase is indicated by the fact that in 1898, 6000 acres were under rice, while in 1914 the figure stood at 45,000 acres. Though the fact is not directly stated in the article, it would appear that the crop was first produced by the East Indian labourers as a food crop, and is now flourishing to such an extent as to permit of export. A further result of the East Indian immigration is seen in the increase in the number of coconut palms, mostly also grown by small farmers. Coconut oil is extensively consumed by the East Indians, and the nuts are also used as cattle food. The export of the nuts still only takes place on a small scale, though it is increasing. Among other products mention may be made of coffee and cacao, both chiefly produced for home consumption, and kola nuts. The cultivation of Para rubber is being attempted, and the probability that the colony will one day become a large exporter of limes is great, for the soil seems very suitable to the tree. Among the coastlands are large areas of pasture well suited for cattle-raising. At present there are about 90,000 head of cattle in the colony, but it is the savannas of the far interior which offer the greatest scope for the development of this industry. Further, the region contains fertile belts in which the ranchers could raise the field and garden produce required for home use.

The forest resources of the colony are very great, balata, rubber, various gums, resins, and minor products being obtainable in addition to valuable timber. Transport presents, however, great difficulties, and the chief needs of the colony are a system of railways in the interior, a better supply of labour, and especially more capital.

EDUCATIONAL.

Relief Model of Wales.—We have received from the National Museum of Wales, Cardiff, a copy of a pamphlet entitled *Descriptive Handbook to the Relief Model of Wales*, which records the completion of a notable piece of work carried out in the Geography Department of the University College of Wales, Aberystwyth, under the direction of Dr. H. J. Fleure. This is the construction of a model of Wales and its English borders, on a horizontal scale of one mile to the inch, and a vertical of 2000 feet to one inch. The model consists of 67 separate blocks, most of which measure 18 inches by 12, the size of the 1-inch Ordnance Survey sheets on which they are based, and an essential feature of the scheme is that copies of individual blocks can be supplied to schools and other institutions at a moderate price. By the kindness of Dr. Fleure copies of two blocks, Barmouth (Cader Idris) and Monmouth, have been sent to the Society, and are on exhibition in the Rooms. Dr. Fleure has also been kind enough to indicate briefly the more important features shown on these blocks, and we print his descriptions below.

The actual work of constructing the model has been done by Mr. Wallace E. Whitehouse, with assistance, and when it is stated that each separate block of the 67 represents some 112 hours of labour, apart from all preliminary experimentation, it is obvious that the energetic Geography Department at Aberystwyth is to be congratulated alike on its courage in beginning such an undertaking, and on the patience, perseverance, and industry which it has displayed in carrying it through.

The work was begun as a part of a general scheme for improving geographical teaching in Wales, and the scheme has included from the first the idea that the separate blocks were to be available for schools and other institutions in different parts of the principality, to be used in connection with the study of the local Ordnance sheet. With the object of increasing their general usefulness for school purposes, the blocks have been left white, except that streams, canals, lakes, and the sea are painted blue. Such blocks can of course be used to plot various distributions, *e.g.* vegetation, minerals, and so forth, and this has been done on some blocks at Aberystwyth, which also possesses a facsimile of the entire model. The *Handbook*, which is the work of Mr. Whitehouse, in addition to an account of the method of construction, and descriptions of certain selected blocks, contains an interesting section on the uses to which the separate blocks can be put in teaching, and in this connection we note with interest the emphasis which is laid

upon the necessity for studying the block in combination with the Ordnance map. We cordially congratulate the lecturer and staff at Aberystwyth on the successful completion of their arduous labours, and recommend to the notice of teachers who are desirous of emulating these labours on a smaller scale the full description, illustrated by diagrams and photographs, of the methods adopted.

Dr. Fleure's description of the two blocks presented to the Society follows:—

"1. *Barmouth (Cader Idris).*—The great Cader Idris Ridge is the sharply marked southern sector of the ancient ring of volcanic rocks which surrounds the grit mountains (Rhinog) above Harlech. Pen-y-gader is 2927 feet above sea-level, and, like other mountains above the 2000-foot contour in North and Central Wales, it is worn to its very core. Great deep cirques occur, typically with little lakes in the hollow, whereas the Welsh cirques of the plateau regions lower than the 2000-foot contour rarely have lakes of this kind. Llyn-y-gader and Llyn-y-cau, on the northern and southern sides of the summit, are fine examples. South-east of the great ridge the typical grits and shales would slope away steadily had they not been so deeply dissected by the wonderfully developed plateau-edge drainage which feeds the river Dyfi, a torrential stream occupying, on the south side of this block, one of the numerous north-east-south-west lines of weakness in Wales. The long series of consequent streams flowing south-east is highly characteristic, and the line of one of them can be traced back, via Corris, right across to Llyn-y-cau, though it is severed by a remarkable fault zone. This fault-zone between the grit-and-shale country and the volcanic rock has been gouged out by ice and water, and now forms a deep gorge stretching from Towyn across the block and onwards to the north-east for many miles. It contains Talyllyn lake and a portion of the Dysynni river, which, however, bends round out of it and into a subordinate parallel line: this may be, but is not necessarily, a case of river capture. As a result of this deep dissection by Dyfi feeders and along the fault-zone, there is a grit-and-shale ridge parallel to Cader Idris with Taren Hendre, 2076 feet, and Taren-y-Gesail, 2187 feet high, and a large number of more or less isolated hills of circumdenudation, especially eastwards. The coastal plain or plateau is little in evidence save at Towyn, where the Dysynni influences large marshy and sandy stretches, so that Towyn has no sea trade. Much good land in the Towyn vicinity has been reclaimed quite recently. The coastal railway, built with evident difficulty by the Cambrian Company, uses the coastal plain where it exists, and is elsewhere obliged to make a ledge in the cliff face. As is the case near the volcanic rocks of Carnarvonshire, some of the shales near Cader Idris have undergone so much pressure that they have cleaved into usable slate. Quarries occur at Abergynolwyn (light railway up the fault-valley from Towyn) and at Corris and Aberllefeni (light railway from Machynlleth). The absence of primeval open moorland means that there was little settlement in this region save on the coastal plateau till the valley-side forests were cleared. Sheep-rearing is the main rural occupation, but the farming population is sparse.

"Barmouth at the extreme north is a tourist centre near the fine estuary (Mawddach), which is probably a fjord containing much boulder clay and sand. It has a small old harbour, but its sea trade is almost *nil*. Machynlleth, to the south-east of the block, is at the focus of the Dyfi system, but its further relations are not shown on this block. Roads are difficult everywhere, and communication and administration are correspondingly difficult. It may be added that Dr. Griffith Taylor calls this district a fine example of a small karling, and compares it in detail with Granite Harbour, East Antarctica.

"2. *Monmouth*.—This block is given as a marked contrast to the other. We have here a rejuvenated peneplain the major part of which is well below 700 feet above sea, while fragments reach the 1000-foot contour. As a result of the rejuvenation the main stream (Wye) has deeply incised its old meanders with little regard to the hardness or otherwise of the rocks (sometimes Old Red Sandstone and sometimes Carboniferous Limestone) which it has exposed. The most famous meander is Symonds Yat, where the two ends of a long loop are separated only by a narrow cliff-neck about 300 feet above the river. The broad flat formed by the river within the loop is another remarkable feature. The rejuvenation has affected tributary streams, and many of their courses are incised, while the whole of the block shows more or less of the deepening of an intricate scheme of valleys, the complexity of which would be typical of the drainage of a peneplain.

"To the west of the Wye is a country dotted with agricultural villages at road- or valley-junctions. There is little to give predominance to any one of them.

"To the east of the Wye is the Forest of Dean, a small coal basin which has kept its ancient forest cover, but is now being much exploited by coal and iron industries of fairly old standing. Its villages and miners' towns lie chiefly around its edges. Probably the forest is a survivor of an ancient Severn forest above the swampy flats of that river, and it long maintained the barrier which the whole Severn region previously formed between England and South Wales. The chief town site is naturally the point where important feeders (Monnow and Trothy) with their valley roads, meet the Wye. Here stands the ancient market town of Monmouth, between Monnow and Wye. Even this town, however, is quite small. The extreme south-east of the block touches the Severn estuary near Lydney."

NEW BOOKS.

EUROPE.

Modern Austria: Her Racial and Social Problems. By Virginio Gayda. London: T. Fisher Unwin, 1915. *Price* 10*s.* 6*d.*

This English edition of Signor Gayda's *La Crisi di un Impero* commences with a study of "Italia Irredenta" specially written by the author, which furnishes a key to Italy's intervention in the present war. The author points out that "before 1866 there had been no persecution of Italians in the Trentino, Istria, or Dalmatia. The Italian character of the Trentino, of Trieste, of Dalmatia was

still respected. The Italian language was considered the true native tongue of these regions." Since then the Austrian Government has harassed Italians under its rule in every way. Out of the 900,000 Italians in Austria, 200,000 are concentrated in Trieste, yet there they have been attacked and dispossessed by the Slav element favoured by the Government. While all the other races in Austria-Hungary have Government schools, the Italians of Trieste and Dalmatia have to pay for their schools out of their own pockets. Although Italian is the one language of Trieste, Italian operas were forbidden, and to sing Garibaldi's hymn led to prison. The confiscation of Italian newspapers amounted annually to hundreds. The Austrian Italians have turned towards Italy asking her aid, and the present war is the result. At the same time, Signor Gayda admits that in Dalmatia the Italian population is in a minority as compared with the Slavs, and remarks, "Undoubtedly the Italian people must come to terms with the Slavs: they must not do violence to their national aspirations, their claims to economic liberty. But it is a question of restoring a just balance, and the natural harmony between Italians and Slavs which existed before 1866, before the Austrian Government's new policy."

The remainder of the volume is devoted to a study of Modern Austria, the fruit of five years spent by Signor Gayda in Austria, and his main theme is the struggle between the feudal aristocracy, German and intensely clerical and conservative, and the popular movements towards racial autonomy and democracy. Signor Gayda declares that what ruined the new Austrian Parliament of universal suffrage was the passion of nationality. The eight nations which go to make up the Austrian empire are the Germans, the Italians, the Northern Slavs (Czechs and Slovaks), the Southern Slavs (Slovenes, Serbs, and Croats), the Poles, the Ruthenes, the Rumanians, and the Magyars. He tells us that the German inhabitants of Vienna detest the Czechs (or Bohemians), who, however, number 300,000 in the capital. In Bohemia they constitute two-thirds, and the Germans one-third of the population, and there is perpetual strife between the two. The author predicts the downfall of the Germans in Austria. Once they were its masters, but the first great blow they received was the Prussian victory over Austria in 1866. After that the Magyars, Czechs, and Poles rose in revolt against them. Then the occupation of Bosnia-Herzegovina in 1878 brought in a Slav mass which is stifling the Germans. Besides this, there is the Serbian peril, for Bosnia, the purest Serbian country, is claimed by Serbia. Further, the author considers that the Ruthenes are really Russians, while, as for the multitude of Jews in Austria, they reign in triumph at Vienna, and are hated with a deadly hatred by the Germans there.

The feudal nobility of Austria retain their old manners and intolerance, are usually very rich and luxurious, and resemble the French nobles on the eve of the Revolution. As for the Church of Rome in Austria, it possesses fabulous wealth and vast landed estates. Austrian schools are religious institutions where the clergy wield despotic, unlimited control. The Church even attempts to conquer the Universities, and the Government always supports it. It was this close alliance between State and Church in Austria which made impossible a friendly policy towards Italy. A chapter on "Austrian Officers" is peculiarly appropriate at present. We are told that they belong to bureaucratic or military families, and that ninety per cent. of the subalterns are crushed by debt. But in Austria there is no true military caste so narrow and exclusive as in Germany. On the whole, whether for instruction or entertainment, we know no account of Austria and her people more readable than this volume, which will deservedly attract public attention, particularly at the present moment.

Serbia, her People, History and Aspirations. By W. M. Petrovitch, Attaché to the Royal Serbian Legation to the Court of St. James. London: G. G. Harrap and Co., 1915. *Price* 3*s.* 6*d. net.*

The present war has, particularly owing to the activities of the British Red Cross Society, brought Serbia and Britain so closely together, that an authoritative book like this will be welcomed by the large circle of those who admire the patriotism and high qualities of the Serbian people. After describing the past history of Serbia, the author discusses its present position from the year 1870, when its reigning King Peter fought on the French side in the Franco-German War. He is a scholar as well as an officer, and translated into Serbian J. S. Mill's *Essay on Liberty.* The author considers that King Peter "has done more than any other monarch to help Serbia to a clear consciousness of her legitimate aspirations and to prepare his country for their realisation." After an allusion to "the avowed and deadly hostility of Austria-Hungary and the certain prospect of war on the first favourable opportunity," the first and second Balkan Wars are described. He attributes the treacherous attack of the Bulgarians on the Serbians to the former's King Ferdinand having been "secretly prompted from Vienna and from Berlin." Then came the Serajevo assassinations in June 1914, which Austria-Hungary falsely laid at the door of Serbia, followed by the ultimatum, and the punitive expedition which ended so disastrously for Austria-Hungary. The author points out that the chief reason, besides the shattering defeats inflicted by Serbia on the Austrian armies, why military operations south of the Danube ceased in December last, was because of Italy intimating to Austria that she would oppose any further military action there.

Perhaps the most original part of the volume relates to Serbian national beliefs and customs. Of these we may mention the following: *Vampires.*—"The belief in the existence of vampires is universal throughout the Balkans, and indeed it is not uncommon in certain parts of Western Europe." In Montenegro, vampires are believed to suck the blood of sleeping men and also of cattle and other animals, returning to their graves, after their nocturnal excursions, under the form of mice. In order to discover these graves, a black horse, without blemish, is led to the cemetery, and the suspected corpse is dug up, pierced with stakes, and burnt. *Nature Worship.*—"Even in our own day there are traces of sun and moon worship, and many Serbian and Bulgarian poems celebrate the marriage of the sun and moon. Every man has his own star which appears in the firmament at the moment of his birth and is extinguished when he dies. Fire and lightning are also worshipped. Similarly the worship of animals has been preserved to our times. The Serbians consider the bear to be no less than a man who has been punished and turned into an animal. This they believe because the bear can walk upright as a man does. The worship of certain snakes is common throughout the Balkans." *Superstition.*—"The foundations of the Christian faith were never properly laid in the Balkans owing to the lack of cultured priests, and this reason and the fact that the people love to cling to their old traditions probably accounts for religion never having taken a very deep hold on them. Even to this day superstition is often stronger than religion, or sometimes replaces it altogether. The whole daily life of the Southern Slav is interwoven with all kinds of superstition."

AMERICA.

The Beothucks or Red Indians, the Aboriginal Inhabitants of Newfoundland. By James P. Howley, F.G.S. Cambridge: University Press, 1915. *Price* 21*s. net.*

In this handsome volume the author presents the information which he has been able to gather by the research of forty years, regarding the aborigines of

Newfoundland. He has laid under contribution the narratives of voyagers of the fifteenth, sixteenth and seventeenth centuries, the reports of explorers, of Government officials, and of inquirers into the condition of the natives, the letters and other writings of those who interested themselves in them, and the statements supplied by the last survivors of the tribe. Further, he deals with the evidence afforded by their language as preserved in certain somewhat meagre vocabularies, and by the implements, ornaments, weapons, etc., found in their burial-places and at the sites of their settlements.

The accounts of the earliest visitors to the island do little to advance our knowledge of its inhabitants. Indeed, the first narrative which is of much value is that of John Guy in 1612. By means of exchanging small articles with the natives, and treating them to food and drink, he established friendly relations with them; and it was agreed that their intercourse should be renewed on his next visit in the following year. Unhappily, a stranger shipmaster, who knew nothing of these arrangements, put into the island; and, when he saw the Indians crowding on the shore, he thought that their intentions were hostile, and fired on them. They regarded this act as an act of treachery, and thenceforth looked upon Europeans as their mortal enemies. From that time onwards the natives and the settlers were at perpetual warfare. The latter fired upon the Indians at sight, plundered their wigwams, and broke up their settlements. The natives killed the settlers whenever opportunity offered, and stole or destroyed their nets. The wanton brutality of fishermen and furriers is described by Captain George Cartwright and others, and their accounts are given at length by our author: and the abominable conduct of these people reached such a pass that in 1769 and again in 1775 and 1776 proclamations were issued by the Government requiring all officers and magistrates to do their utmost to discover and send to England for trial those who had been guilty of murdering the natives. Efforts were made not only by the officials of the island, but by the members of an institution formed to protect the Indians, to open friendly communications with them; but those efforts came too late, and by the close of the first quarter of the nineteenth century the Beothucks were exterminated.

They seem to have been a fine race of hunters and fishermen, well formed, and of medium height; and their wigwams, canoes, weapons and implements show that they were superior to their Indian neighbours in the simple arts of life. They seem, however, to have been unacquainted with the making of pottery. They showed a special care in the disposal of their dead, and the articles which they buried with them indicate that they believed in a future life.

They gained the appellation of "Red Indians" from their practice of painting not only their bodies, but their utensils, canoes, and lodges with red ochre. According to Professor Gatschet the word "Beothuck" was their generic expression for "Indian"; and, accordingly, it seems probable that the tribe used the term as a distinguishing mark. They were "Indians" *par excellence*, as contrasted with their neighbours, just as many peoples call themselves by a name signifying "men," while they call the tribes around them by some name signifying contempt or hatred.

The origin of the Beothucks has been matter of dispute. Some have regarded them as kinsmen of the Norsemen, who have been said to have discovered America in the tenth century; others, as related to the Basques. But the best opinion is against a European and in favour of an American origin. Here, again, we are met by a divergency of view. Professor Latham believes the tribe to be a branch of the Algonkin family of North American Indians; others assign it to the Eskimo race; while others regard it as akin to the Micmac. Professor Gatschet

says that there is nothing in the Beothuck language to suggest an Algonkin or Chippewan connection, and concludes that this people was a people *sui generis*, apart and distinct from all others of whom we have any knowledge.

The volume is enriched with numerous plates, on which the implements of the Beothucks are figured, and the remarkable drawings of the last survivor of the race reproduced.

Ten Thousand Miles with a Dog-Sled: A Narrative of Winter Travel in Alaska. By Hudson Stuck, D.D., Archdeacon of the Yukon. London: T. Werner Laurie. *Price* 16*s. net.*

This volume, which gives a vivid account of life in Alaska, describes a number of winter journeys in the country, undertaken at different periods, and covering considerably more than the ten thousand miles of the title. To the geographer the most interesting points will be the incidental notes on phenomena of scientific importance, and the details given as to the difficulties of communication in winter in a country whose streams constitute in summer the main routes of travel. In a sense, indeed, they preserve this character even when ice-bound in winter, for journeys then are generally carried on in sledges drawn by dogs over the ice of the waterways. The importance of the river valleys, especially those of the larger rivers, has its natural consequence in attracting settlements to their banks. In this connection it is interesting to note that Dr. Stuck in his narrative emphasises repeatedly the severe cold often found along the river valleys in winter, while the banks of the creeks, or mountain tributaries of the main streams, have a much less severe winter climate. This is of course due to the phenomenon of inversion of temperatures, familiar to all geographers, but while in *e.g.* the Swiss Alps it has been long realised, so that winter villages tend to avoid the valley floors, it does not seem as yet to have affected the site of settlements in Alaska.

Another point upon which the author lays great stress has not, apparently, as yet found its way into geographical text-books. This is the frequent flooding of the river ice with water during the winter season. The cause lies in the fact that where the river is shallow it freezes throughout, forming a solid block of ice. But elsewhere water continues to flow beneath the ice, with the result that it buckles under the pressure, and ultimately gives way, artesian fountains of water gushing out and flooding the whole surface for miles. The surface flood soon freezes, but its presence is a great obstacle to winter travel, not only because of the danger of the sledges breaking through the layer of new ice, but also because both men and dogs risk getting their feet wet, a very great danger at the temperatures which prevail.

We have noted a number of other interesting points, but it is perhaps sufficient to add that the people of Alaska, native and immigrant, come in for a considerable amount of attention, and that the author speaks with great frankness in regard to the administration, which is apparently often inefficient and sometimes worse; the conduct of the military at the various posts come in also for much criticism. We recommend the book especially to geographers as giving a good idea of modes of communication in winter in a sub-arctic land. It contains a map and many photographs.

In the Oregon Country. By George Palmer Putnam. New York: G. P. Putnam's Sons, 1915. *Price* 6*s. net.*

The author's intimate knowledge of the territory of which he writes, gained by numerous wanderings off the beaten track and by mountain climbing and canoeing

excursions, enables him to convey to the reader some interesting information regarding the attractions to the nature lover which abound in the Oregon country. That country is without doubt richly endowed by nature, and the scenic features are wonderful in their variety and beauty. While the author devotes a chapter to the coming of the railroads without which the rapid development of the resources of the West and the attainment of its present prosperous condition would have been impossible, he is mainly concerned with the pleasures of the out-of-door life. The hunter, the fisher, the mountain climber, and the canoer are all treated to descriptions of a country which offers unlimited scope for indulgence in their respective pastimes, while the humble rambler with no object in view save the contemplation of the beautiful in nature is made acquainted with scenes in which he can regale himself to his heart's content. There are a number of fine illustrations.

GENERAL.

The World's Cotton Crops. By John A. Todd, B.L. London: A. and C. Black, 1915. *Price* 10*s. net.*

The recent agitation for government action in connection with the available cotton supplies of the world gives an added interest to the publication of this volume by the Professor of Economics in University College, Nottingham. Apart altogether from the war, various factors and developments were rapidly bringing about a crisis in the world's cotton interests, and this excellent survey of the situation and of the problems connected with the cultivation of cotton is opportune and to be welcomed. The author has brought together a vast amount of official and other information, much of which is not easily accessible to the ordinary reader, and to his treatment of the question he has been able to add the results of his own experience and observation both in Egypt, where for several years he was a member of the Khedivial School of Law, and during a visit to the Cotton Belt of the United States, where he was able to study the problem at first hand and from the cultivator's point of view.

One of the merits of this exhaustive study, and one which should commend it to the lay reader, is that while giving an adequate account of the conditions of cultivation and the treatment of the cotton crop, it is remarkably free from unnecessary technical details; and where the discussion of technical questions is unavoidable, as, for example, in describing the involved operations of the cotton market, the treatment is always lucid and straightforward. The bulk of the volume is concerned with the conditions of cotton cultivation in the individual countries of the world; the geographical distribution of the cultivation, its climatic and soil conditions, the selection of the most suitable species for different localities, the difficulties with which the grower has to contend, especially the destructive boll weevil, which is steadily restricting the area of cultivation in many districts of the United States, the yield and quality of the crop, the methods of marketing, the fluctuation of prices, and the possibilities of extending the area of cultivation and increasing the world's total supplies, these are among the principal topics with which the author deals. The importance of the labour problem is clearly recognised, as for example in the United States, where the author has evidently been impressed by the inefficiency of the negro. To illustrate the loss which is caused by the labour difficulty and the inevitable delay in harvesting the crop, before it is spoilt by rain or some other cause, he quotes the opinion of a grower that only 75 per cent. of the available crop can be harvested, and half of that is in bad condition. It would be a distinct advantage if the author could

supply some more detailed information on the question of the system of land tenure in the different cotton-growing lands, and its influence upon the output, for obviously this must be a most important factor in any attempt to extend the area of cultivation, especially in our own colonies and possessions. Another matter on which it would be distinctly useful to have a fuller discussion is the question of the cost—apart from the facilities—of transport. It would be interesting to know how much of the difference which exists between the price paid by the consumer and the amount which ultimately finds its way into the pockets of the cultivator is due to this factor of transport. This point is again of great importance in the development of new areas of cultivation. Two useful chapters of the volume deal with the uses of cotton and its by-products; the closing chapter is devoted to a discussion of the effects of the war upon the problem, and obviously this must be the least satisfactory part of the book, simply because the treatment, as far as the future is concerned, must be entirely speculative. But the author gives a very succinct account of the steps taken to prevent the financial collapse of the cotton market at the outset of the war. Each section of the book is accompanied by a short bibliography of the chief sources of information; in the references to cotton growing in India mention should have been made of the excellent article in Watt's *Commercial Products of India*. It is sometimes difficult to understand the arrangement of the chapters; there seems no reason why the chapter on long-staple American Upland cotton, and perhaps that also on Sea Island cotton, should not have been placed in their proper relation to the chapters dealing with America.

In addition to several useful and clear maps, the volume contains a large number of excellent and instructive photographs, although these sometimes have little connection with the text. A large appendix gives a most valuable series of statistical tables and diagrams, which serve to bring out the main contention of the author as to the critical relation between the world's cotton supply and demand, and the immediate need for increasing the output, especially by extending the area and improving the methods of cultivation. This valuable geographical and economic study of an all-important subject requires now to be supplemented by a similar investigation of the world's cotton industry and trade.

British Rainfall, 1914. By Hugh Robert Mill and Carle Salter. The fifty-fourth annual volume. London: Edward Stanford, 1915. *Price* 10*s*.

The new issue of this familiar blue volume shows a slight change of shape, for the page has been widened by half an inch to admit of an extra column in the tables, which gives the total annual rainfall for each station in millimetres. The change has been rendered necessary owing to the fact that the Meteorological office has introduced a new system of units for the official records of British meteorology, based upon the metric system. The unit employed by the observers whose results are tabulated in *British Rainfall* was, with one exception, the inch, and the director regards it as essential that the actual readings made should be published, to avoid errors in conversion. But for convenience-sake the total annual readings have all, with the assistance of a grant from the Meteorological office, been converted into millimetres, a process which involved 5000 conversions. The widening of the page makes the volume a little thinner than usual, but the height remains the same. Apart from the change of shape and its consequences the book shows little modification as compared with previous years. The director states that the income of the organisation has dropped considerably, as indeed was to be expected, but meantime there is every reason to believe that all the routine work will be carried out during the present year, and the records for last year in the volume show the usual steady progress.

EDUCATIONAL.

The Atlas Geographies. Part III. *Senior Geography: No. 3, Asia.* By THOMAS FRANKLIN, A.C.P., A.R.S.G.S., and E. D. GRIFFITHS, B.Sc., F.R.G.S., F.C.S. Edinburgh and London: W. and A. K. Johnston, Ltd., 1915. *Price* 1*s.* 10*d. net.*

This volume gives an excellent and comprehensive survey of the continent of Asia, and is specially suited to the needs of senior students. The treatment is regional, and climatic conditions are specially emphasised. As is to be expected, the maps are plentiful, clear, and thoroughly useful.

Questions and Exercises on Mackinder's Elementary Studies in Geography: Our own Islands; Lands beyond the Channel; Distant Lands. By E. G. R. TAYLOR, B.Sc. London: George Philip and Son, Ltd., 1915. *Price* 3*d. each.*

These three little books (which are graded in the order given) supply sets of questions and exercises on Mr. Mackinder's well-known works. That the books form a worthy supplement to the works is surely their highest praise. Miss Taylor is a geographer of the first rank, and only a skilful teacher could have set the problems, for they demand more than a mere mechanical solution. Most of the exercises are geographical in the best sense, and steer clear of the mathematical tendency so common in many of our so-called "practical" geography books.

BOOKS RECEIVED.

Stanford's Compendium of Geography and Travel (New Issue): North America. Vol. I. *Canada and Newfoundland.* Edited by HENRY M. AMI, M.A., D.Sc., F.G.S., F.R.G.S., F.R.C.S. Maps and Illustrations. Second Edition, revised. Crown 8vo. Pp. xxviii + 1069. *Price* 15*s. net.* London: Edward Stanford, Ltd., 1915.

Arms and the Map: A Study of Nationalities and Frontiers. By IAN C. HANNAH, M.A. Crown 8vo. Pp. 261. *Price* 2*s.* 6*d. net.* London: T. Fisher Unwin, 1915.

Belgium and Germany: Text and Documents. Preceded by a Foreword by HENRI DAVIGNON. Demy 4to. Pp. 132. *Price* 6*d.* London: Thomas Nelson and Sons, 1915.

The Russian Year-Book for 1915. Compiled and edited by N. PEACOCK. Demy 8vo. Pp. viii + 623. *Price* 10*s.* 6*d. net.* London: Eyre and Spottiswoode, Ltd., 1915.

The Famous Cities of Ireland. By STEPHEN GWYNN. With Illustrations by HUGH THOMSON. Demy 8vo. Pp. xii + 352. *Price* 5*s. net.* Dublin: Maunsel and Co., 1915.

My Japanese Year. By T. H. SANDERS, M. Com. With a Frontispiece in Colours and Illustrations from Photographs. Demy 8vo. Pp. vii + 345. *Price* 10*s.* 6*d. net.* London: Mills and Boon, Ltd., 1915.

The Hudson Bay Road (1498-1915). By A. H. DE TRÉMAUDAN. With 30 Illustrations and 2 Maps. Crown 8vo. Pp. xvi + 264. *Price* 7*s.* 6*d. net.* London: J. M. Dent and Sons, Ltd., 1915.

South-West Africa. By WILLIAM EVELEIGH. Crown 8vo. Pp. 260. *Price* 5*s. net.* London: T. Fisher Unwin, Ltd., 1915.

Cathay and the Way Thither: Being a Collection of Medieval Notices of China. Translated and edited by Col. Sir HENRY YULE, R.E., C.B., K.C.S.I. New

Edition, revised by Henri Cordier, D.Litt., Hon. M.R.A.S., Hon. Cor. M.R.G.S., Hon. F.R.S.L. Vol. iii. Demy. Pp. xx + 269. London: Hakluyt Society, 1915.

The Quest and Occupation of Tahiti by Emissaries of Spain during the Years 1772-1776. Told in Despatches and other Contemporary Documents. Translated into English and compiled by Bolton Glanvill Corney. Vol. ii. Sm. Royal. Pp. xlvii + 521. London: Hakluyt Society, 1915.

L'Alliance Balkanique. By Iv.-E. Guéchoff. Un volume in-16 broché, *Prix* 3 *fr.* 50. Paris: Hachette et Cie, 1915.

An Untamed Territory: The Northern Territory of Australia. By Elsie R. Masson. With Maps and Illustrations. Crown 8vo. Pp. xii + 181. *Price* 6*s.* London: Macmillan and Co., Ltd., 1915.

Anglo-Canadian Year-Book. By Keith Morris. Demy 8vo. Pp. 336. *Price* 5*s. net.* London: William Stevens, Ltd., 1915.

My Recollections of Australia and Elsewhere, 1842-1914. By the Hon. John Mildred Creed. With 16 Full-Page Illustrations. Demy 8vo. Pp. xvi + 338. *Price* 16*s. net.* London: Herbert Jenkins, Ltd., 1915.

Fifty Years' Work in the Holy Land, 1865-1915. By Col. Sir C. M. Watson, K.C.M.G., C.B., M.A. Crown 8vo. Pp. 190. *Price* 3*s.* 6*d.* London: Palestine Exploration Fund, 1915.

A Woman in the Sahara. By Helen C. Gordon. Illustrated. Crown 8vo. Pp. xiv + 354. *Price* 6*s. net.* London: William Heinemann, 1915.

Savage Man in Central Africa: A Study of Primitive Races in the French Congo. By Adolphe Louis Cureau. Translated by E. Andrews. Demy 8vo. Pp. 351. *Price* 12*s.* 6*d.* London: T. Fisher Unwin, 1915.

The Ideal Regional Geographies. Part i. *General Introduction.* Pp. 98. Crown 8vo. *Price* 6*d. net.* Glasgow: Grant Educational Co., Ltd., 1915.

In Many Lands. By Samuel Gibson. Books i. and ii. Pp. 136. Crown 8vo. *Price* 1*s. each.* Glasgow: Grant Educational Co., Ltd., 1915.

Edinburgh University Calendar for 1915-1916. Edinburgh, 1915.

The Crater Lake, National Park. (General Information.) Pp. 18. Washington: Department of the Interior.

The Sequoia and General Grant National Park. Season 1915. Pp. 40. Washington: Department of the Interior.

Descriptive Handbook of the Relief Model of Wales. By Wallace E. Whitehouse, L.C.P. With an Introduction by H. J. Fleure, D.Sc. Pp. 71. Cardiff: Published at the Museum, 1915.

Notes of Lectures on Map Reading and Sketching. By Second-Lieut. Courtney Terrell. Pp. 36. *Price* 1*s. net.* London: Gale and Polden, Ltd, 1915.

Colonial Reports (Annual).—Weihaiwei (844); Grenada (852); Bermuda (853); Malta (854); Ceylon (855); Hong Kong (856).

Diplomatic and Consular Reports.—Trade of Rosario (5458); Hawaii (5459); Hangchow (5460); Foochow (5461); Brest (5462); Ichang (5463); Norway (5464); Denmark (5465); Samoa (5466); Swatow (5468); Tientsin (5469); Teng Yueh (5470); Chinkiang (5472); Antofagasta and Atacama (5476); Dominican Republic (5477); Shasi (5479); Shanghai (5480).

Board of Agriculture for Scotland: Agricultural Statistics, 1914. Vol. iii. Part ii. Glasgow, 1915.

Survey of India, General Report, 1913-14. Calcutta, 1915.

Department of Lands and Survey: Report on the Survey Operations for the Year 1914-1915. Wellington, 1915.

Census of India, 1911. Vol. xv. *United Provinces of Agra and Oudh.* Part iii. Allahabad, 1915.

United Provinces District Gazetteers. 5 Volumes. Allahabad, 1915.
Bombay Presidency Gazetteers. 8 Volumes. Bombay, 1914.
Palamau District Gazetteers. 1 Volume. Patna, 1913.
Assam District Gazetteers. 3 volumes. Shillong, 1915.

Publishers forwarding books for review will greatly oblige by marking the **price** *in clear figures, especially in the case of foreign books.*

NEW MAPS.

EUROPE.

ORDNANCE SURVEY OF SCOTLAND.—The following publications were issued from 1st April to 30th June 1915 :—

Six-inch and Larger Scale Maps.—Six-inch Maps (Revised). Quarter Sheets, with contours in red. Price 1s. each. *Edinburghshire.*—8 NE., SE. *Lanarkshire.*—16 NW. *Renfrewshire.*—5 SW.; 6 SE.; 10 NE.; 11 NW., SE.

1 : 2500 Scale Maps (Revised), with Houses stippled, and with Areas. Price 3s. each. *Fifeshire.*—Sheets XVIII. 3, 8; XIX. 1; XXXII. 12; XXXIII. 14, 15; XXXVII. 7, 8; XXXVIII. 3, 7. *Kinross-shire.*—Sheets XVII. 4, 11, 16; XVIII. 1, 2, 3, 5, 6, 8, 9, 14; XXVI. 4, 6. *Linlithgowshire.*—Sheets IV. 1, 2. *Stirlingshire.*—Sheets XVIII. 6, (11 and 7). Price 1s. 6d. each.

Note.—There are no coloured editions of these sheets, and the unrevised impressions have been withdrawn from sale.

BARTHOLOMEW'S QUARTER-INCH TO MILE MAP OF SCOTLAND.

Sheet 4, Glasgow and Oban District. Orographical colouring, and Roads. New Edition, 1915. Price 1s. 6d. net; or mounted on cloth, 2s. net.
John Bartholomew and Co., Edinburgh.

BARTHOLOMEW'S CONTOUR ROAD MAP OF ENGLAND AND WALES. — Scale 13 miles to an inch. New Edition, 1915. Price 1s. net; or mounted on cloth, 2s. net. *John Bartholomew and Co., Edinburgh.*

BARTHOLOMEW'S HALF-INCH TO MILE MAP OF ENGLAND AND WALES.

Sheet 10, Lincoln Wolds. Orographical colouring. New Edition, 1915.

Sheet 25, Bedford, Hertford, etc. Orographical colouring. New Edition, 1915. Price 1s. 6d. net; or mounted on cloth, 2s. net.
John Bartholomew and Co., Edinburgh.

EUROPEAN WAR MAPS.

Map of Slav Territories East of the Adriatic. By Arthur Evans. (Issued for the Balkan Committee.) Scale 1 : 1,500,000. 1915. See p. 573.
Sifton, Praed and Co., Ltd., London.

Bartholomew's War Map of Europe and the Mediterranean.—Scale 1 : 5,600,000. Political colouring. New Edition. Sept. 1915. Price 1s. net; or mounted on cloth, 2s. net. *John Bartholomew and Co., Edinburgh.*

"Daily Telegraph" War Map No. 9.—Picture Map of the Dardanelles, Bosporus, including the whole of Turkey in Europe. By Alex. Gross, F.R.G.S. Price 1s. net. 1915. *"Geographia," Ltd., London.*

Johnston's War Map of Europe, 1914-15.—Full coloured. Showing the whole of the War Areas. Scale 1 : 4,800,000. Price 1s. net. 1915.
W. and A. K. Johnston, Edinburgh.

Johnston's New Contour Coloured Map of Eastern War Area. New Edition. Showing furthest limits of Russian invasion of enemy territory, also battle line on 4th August 1915 and 13th September 1915. Scale 36 miles to 1 inch. Price 1s. 6d. net. 1915.

W. and A. K. Johnston, Edinburgh.

Philips' Large Scale Strategical War Map of Europe.—Southern Area. With complete Index. Edited by George Philip, F.R.G.S., assisted by a military expert. Scale 1 : 1,140,000, or 18 miles to 1 inch. 2s. 6d. net, paper. On cloth, to fold, or with roller to hang, 6s. net. 1915.

George Philip and Son, Ltd., London.

Supplementi al Teatro della Guerra Europea. I. Scacchiere Franco-Belga-Tedesco con Indice-dizionario di 2000 nomi. Alla scala di 1 : 1,000,000. II. Scacchiere Russo-Austro-Tedesco con Indice-dizionario di 4000 nomi. Alla scala 1 : 1,500,000. Prezzo L. 1.50. 1915.

Istituto Geografico de Agostini, Novara.

Carta-Base pel Raggruppamento Politico delle Nazionalita nell' Austria-Ungheria e Stati Limitrofi. Por Adriano Colocci. Prezzo L. 0.40. 1915.

Istituto Geografico de Agostini, Novara.

Teatro della Guerra Europea.—Alla scala di 1 : 4,000,000. Prezzo L. 1.

Istituto Geografico de Agostini, Novara.

La Guerra nell' Adriatico.—Carta del Mare Adriatico con 18 Piani Portuali. Alla scala di 1 : 1,500,000. Prezzo L. 1. 1915.

Istituto Geografico de Agostini, Novara.

I Due Confini d'Italia.—Carta Fisico-Politica. Alla scala di 1 : 1,250,000. Prezzo L. 0.50. 1915. *Istituto Geografico de Agostini, Novara.*

Europa, Sud-Orientale.—Alla scala 1 : 3,000,000. Prezzo L. 1.00. 1915.

Istituto Geografico de Agostini, Novara.

Carta del Teatro della Guerra Nostra.—Carta a tinte Ipsografiche alla scala di 1 : 500,000. Prezzo L. 1.50. 1915.

Istituto Geografico de Agostini, Novara.

La Regione Veneta e le Alpi Nostre.—Carta Etnico-Linguistica alla scala di 1 : 500,000. Prezzo L. 1.00. *Istituto Geografico de Agostini, Novara.*

Le Tre Venezie.—La Venezia Tridentina, la Venezia Propria, la Venezia Giulia. Grande Carta Ipsometrica in due Fogli. Scala 1 : 250,000. Prezzo L. 3. 1915. *Istituto Geografico de Agostini, Novara.*

This interesting series of Italian war maps, fully illustrating the European as well as the Italian campaign, is produced in most excellent style by the now well-known "Istituto Geografico de Agostini" at Novara.

AMERICA.

ONTARIO AND QUEBEC.—Map showing Branches of Chartered Banks on different railway systems. Scale 25 miles to an inch. 1915.

Department of the Interior, Ottawa.

UNITED STATES.—General Map on scale of 1 : 2,500,000 or 40 miles to an inch. 1914 edition of original map by Henry Gannett. Size 49 × 76 inches. Also another edition of same map with contour lines.

United States Geological Survey, Washington, D.C.

UNITED STATES SURVEY.—Topographic Sheets, issued 1914-1915, on various scales. The figures after the name of each state indicate the number of sheets received. Price, with a few exceptions, 5 cents each sheet.

Scale 1 : 250,000, or about 4 miles to an inch.—Alamo National Forest, New Mexico, 1 sheet; Copper River Region, Alaska, 1 sheet.

Scale 1 : 125,000, or about 2 miles to an inch.—Arizona, 1; California, 4; Montana, 2; Oklahoma, 1; Oregon, 1; Wyoming, 1.

Scale 1 : 62,500, or about 1 mile to an inch.—Alabama, 1; Alaska, 1; Arizona, 3; California, 2; Colorado, 3; Idaho, 1; Illinois, 6; Iowa, 2; Kentucky, 3; Maine, 2; Michigan, 2; Minnesota, 2; Mississippi, 1; Missouri, 4; Montana, 6; Nebraska, 1; New York, 3; New Mexico, 1; Ohio, 17; Oregon, 2; Texas, 2; Utah, 1; Vermont, 1; Virginia, 1; West Virginia, 6; Washington, 1; Wyoming, 2.

Scale 1 : 31,680, or about 2 inches to a mile.—California, 13 sheets; Louisiana, 1.

Scale 1 : 31,250, or about 2 inches to a mile.—Mesa Verde National Park, Colorado, 1 sheet.

United States Geological Survey, Washington, D.C.

EDUCATIONAL AND GENERAL.

INTERNATIONAL MAP.—Scale 1 : 1,000,000 or 15.78 miles to an inch. The following new sheets are issued, 1915 :—

Europe, Nord K 33. Roma. (*Istituto Geogr. Militare, Roma.*)

Asia, North E 43. Bombay. (*Survey of India Office, Calcutta.*)

Africa, North H 35. Alexandria. (*Survey Office, Cairo.*)

,, **Sul F 36. Inhambane.** (*Commissao de Cartografia, Lisboa.*)

America, North J 10. San Francisco Bay.
(*United States Geological Survey, Washington.*)

ATLANTE GEOGRAFICO METODICO.—Dott. Prof. Giovanni de Agostini. Terza Edizione. 75 Tavole con 196 Carte cartine e figure. Prezzo L. 8.50. 1915.
Istituto Geografico de Agostini, Novara.

A most excellent and complete school atlas of comparative, physical, and political geography. This edition, the third, is amplified and revised to date.

ATLANTE GEOGRAFICO MUTO.—Fisico politico a colori ed albo di Esercitazioni Cartografiche, in due fascicoli. G. de Agostini. Fascicolo Primo. Prezzo L. 1.50. Fascicolo Secondo. Prezzo L. 1.00.
Istituto Geografico de Agostini, Novara.

CALENDARIO ATLANTE DE AGOSTINI 1915.—Anno XII. Serie II. vol. ii.
Istituto Geografico de Agostini, Novara.

The special feature of the Calendar for this year is an article on "The Travels of the Duke of the Abruzzi," with his portrait as a frontispiece.

CONTOUR ATLAS AND GEOGRAPHY OF THE WORLD.—54 pp. Price 4d.

CONTOUR ATLAS AND GEOGRAPHY OF EUROPE.—24 pp. Price 3d.
The Grant Educational Co., Ltd., London and Glasgow.

These are useful geographical exercise books.

THE SCOTTISH

GEOGRAPHICAL

MAGAZINE.

A HALF-CENTURY OF GEOGRAPHICAL PROGRESS.[1]

By J. Scott Keltie, LL.D., Gold Medallist of the Royal Scottish Geographical Society.

(With Maps.)

When I was honoured with a request from your Council to open the new session of the Royal Scottish Geographical Society, by a lecture on geographical progress during the last half-century, I am afraid I accepted the invitation with a light heart. It was only when I began to face the subject that I realised its magnitude. To do it justice would take volumes. In the brief space of a lecture I can only hope to indicate succinctly the lines upon which the main advances have been made; to bring before you an impressionist picture, marked, it may be, by some of the bewildering confusion characteristic of that evolution in the domain of art.

Before dealing with the main subject of to-night's meeting, it may not be inappropriate to inquire briefly to what extent the war has affected geographical work. So far as exploration is concerned, I fear the result has been to discourage new exploring expeditions on the part of the nations that are engaged in this momentous struggle between freedom and thraldom. Fortunately the great British expeditions that had been initiated before the war began are still "carrying on," as the sailors say, in regions which the war does not touch. Sir Aurel Stein is continuing his great work in Central Asia, with magnificent results, and is now in the Pamirs on his way to Meshed and Seistan. Your former Secretary, Sir Ernest Shackleton, whose expedition had been organised before the war, proposed to the King, I believe, to place the services of

[1] An address delivered before the Society in Edinburgh on Nov. 18, 1915.

himself, his staff, and all his equipment at the disposal of the Government, but His Majesty urged him to carry out the work of his expedition as planned. Let us hope that he has landed safely on the Antarctic Continent, and, if not already well on the way, is prepared to start as soon as the propitious moment arrives. The war has already exacted a heavy toll on explorers. Captain Toppin, the leader of the Peruvian-Boundary Expedition, who was to have lectured on the work of the expedition to the Royal Geographical Society last session, lost his life soon after joining his regiment at the front, along with his colleague, Captain Moores. Captain Shakespear, who carried out a splendid journey across Arabia, just before the war began, was ordered to return to his post at Koweit, Arabia, and shortly after perished in a fight between two Sheiks, one pro-British and the other pro-Turkish. Apart from such unfortunate results the geographical work at the Universities has in most cases been seriously affected, and that again has had its influence on the work of geographical research.

On the other hand, the maxim that war is the handmaid of geography has once more been amply verified, as well as the converse that geography is the handmaid of war. Our papers every day abound in information for the multitude, in many cases accompanied by maps, relating to the various countries involved in Europe, Asia, and Africa. Those actually engaged in the war have found how indispensable are good large-scale maps of the regions in which operations are being carried on, as well as detailed information concerning their physical and economical geography, their geology, climatology, and other characteristics. I may venture to say that since the beginning of the war the Royal Geographical Society has been doing so much work for various Government departments that its staff has had to be increased to the limits of its accommodation. One result of this special work was described in the July *Journal* by my successor, Mr. Arthur Hinks, in the shape of a new map of Europe and the Near East, on the plan laid down for the International map of the world, which, when complete, will be useful for many purposes besides that for which it has been specially undertaken. I need hardly remind you to what extent geographical considerations have been adduced by certain of the combatants at least to disguise individual national ambitions or defences. Such then are some of the ways in which this mighty war and geography have interacted on each other; on the whole we may hope that the final result will be to the advantage of British geography, as we hope it will be to many other British interests. Of the many books and articles which have been called forth by the war I venture to think that one of the most useful and most instructive is the work on the Balkans by Miss Marion Newbigin.

First of all it may be useful to make it clear to ourselves what is the field covered by the subject, the progress of which during half a century it is our task to trace. I think for our purpose we may regard geography as the science which deals with the distribution of the features of the earth's surface and of all that it sustains, mineral, vegetable and animal, including man himself. In fact, man is the ultimate factor in the geographical problem, the final object of which is to investigate the cor-

relations which exist between humanity and its geographical environment. It is evident then that before the geographer is in a position to apply scientific methods to the problem which it is his function to solve, he must first have an adequate knowledge of the data which form the terms of the problem. Such data can only be obtained by the exploration of the earth's surface conducted by scientific methods. Therefore in attempting to review the progress of geography during the past half-century, our first task is to ascertain what have been the main additions to our knowledge of the earth's surface by means of exploration. Secondly, we should endeavour to ascertain what progress has been made in our methods of dealing with such results; has there been any marked advance in the application of scientific methods to geographical problems? Thirdly, what improvement has been introduced into geographical education?

In attempting to take stock of the results of the exploration of the unknown and little known regions of the globe during the last half-century, starting for convenience with the year 1860, I think it is safe to say that we have to go back to the half century which followed 1492 (when Columbus stumbled on a New World) before we find a period so prolific. The two Poles have been reached, and large additions made to our knowledge of the Polar regions. The unknown two-thirds, at least, of the Dark Continent have been more or less provisionally mapped, and all but an insignificant fraction partitioned among the Powers of Europe. Great areas of North America have been surveyed and occupied, while much has been done for the exploration of Central and South America. The map of Asia has to a large extent been reconstructed, whilst the vast unknown interior of Australia has been traversed in all directions. Even much of Europe has been resurveyed. A new department of science, Oceanography, has been created, as the result of the *Challenger* and other oceanic surveys. But let us deal with the subject in somewhat more detail, beginning at the north.

The leading episodes that have marked the progress of exploration since 1860 must be within the memory of many of you, though probably few of the audience can go back to the forties and fifties as I, alas, can do. But time will not permit of my dealing in detail with the episodes that have marked the progress of discovery, only with the results.

What then has been the result of all the half-century's strenuous efforts to unravel the secrets of the lands that fringe the great ice-bound ocean around the North Pole. In 1860 the north coast of Greenland had never been reached, and the east coast beyond 65° N. was only known in patches. Our knowledge of the Arctic archipelago was greatly defective. What lay between Spitsbergen and Novaya Zemlya was entirely unknown; the coast of Siberia was imperfectly mapped, and the seas beyond largely unexplored. No soundings had been taken in the Arctic Ocean, and the furthest north reached was a little over 82°, a latitude reached by Hudson some three hundred years ago. Now Greenland, largely through Peary's work, has been extended to over 83° N., and the whole coast has been practically charted: the Arctic archipelago has been greatly ex-

tended; Franz Joseph Land has been placed on the map; a large island has been discovered to the north of Siberia, and another on the west of the Arctic archipelago; great additions have been made to our knowledge of Spitsbergen and Novaya Zemlya; depths of 2000 fathoms have been sounded in the Arctic Ocean, and the North Pole itself has been located amid thick-ribbed ice. Besides these geographical discoveries, substantial contributions have been made to other departments of science which enable us to understand better the regime of these inhospitable regions in the general economy of our earth. There still remains much to be done, especially in the wide region to the north of Behring Strait, before our knowledge is complete.

Turning to the other end of the earth, there is a great gap between the work of Ross, Wilkes, D'Urville and Bellingshausen, and the outburst of enterprise in the exploration of the Antarctic continent in quite recent years. Borchgrevink and the Belgians under Gerlache began the campaign some eighteen years ago. But undoubtedly the first organised attempt on a great scale to scatter our ignorance of a continent as large as Europe, though probably of little use to humanity, was made by the great expedition under Captain Scott, whose tragic and heroic death with his four companions, some years later, places them high up on the nation's roll of honour. Amundsen, who discovered a new and easy route, rushed in and reaped the fruits of the ten years' labours of these indomitable British explorers. Then there is Drygalski's expedition, and we have Bruce, Shackleton, and Mawson (from Australia) and Charcot on the Graham Land side. John Murray saw the land from the *Challenger* in the seventies, and with his usual insight surmised that here lay a great continent. Before the campaign began, the only big gap was that made by Ross in the Ross Sea, and along the Great Ice Barrier, with somewhat hypothetical patches elsewhere. Now it may be said truly that in the period with which we are dealing, and especially in the last eighteen years, enormous additions have been made to our knowledge of the outline, and even a large extent of the interior, of the most repellent land on the face of the earth. It may be said that, with Ross's discovery as a basis, within the last fifteen years the whole coastline of the Antarctic continent has been laid down from King Edward VII. Land to Kaiser Wilhelm Land, considerably more than a quadrant of the circumference, and that from the observations which have been made the interior is a lofty, ice-covered plateau bordered in parts by still higher mountain ranges, with indications that in past ages a climate favourable to temperate or even sub-tropical vegetation must have existed. The meteorological work carried out, especially by Mawson's expedition, may turn out to be of practical service to meteorology in general, and to that of Australia in particular. In the interests of science at least, it is hoped that the entire outline of the Antarctic continent will be laid down, and further investigations carried out sufficient to satisfy our natural curiosity as to the past history of this great ice-bound land.

As a contrast to the frigid regions with which we have been dealing, let us turn to the most tropical, and in 1860 the most unexplored of all

the continents, Africa. One of my earliest geographical recollections is of a map of Africa somewhere in the forties and early fifties on the wall of the school of my boyhood; begrimed and faded, with the word "unexplored" in large capitals, from the Sahara to the borders of the Cape. I am afraid we boys were not sorry for the great blank without a single name to plague our memories.

As represented on the best maps of 1860, Africa from about 10° N. to about 20° S., was mainly a blank checkered here and there with conjectural and imaginary features. Livingstone and Burton and Speke had been at work. We see the course of the Zambezi laid down, and vague indications given of Lake Tanganyika, Victoria Nyanza, and Lake Nyasa. The Nile is timidly brought down in dotted lines towards the Equator. A little bit of the lower Congo is shown with many dotted lines of conjectural tributaries joining it from various directions, but no indication given of its real course. Our positive knowledge was comparatively infinitesimal. It is not too much to say that of the eleven millions of square miles of Africa something like six millions was practically unknown, and of the remaining five millions probably not more than one million was mapped with anything approaching accuracy. The real inspiring initiative of the modern exploration of Africa undoubtedly rests with David Livingstone, who in the fifties led that ever memorable expedition across south-central Africa which placed the great Zambezi for the first time throughout its length upon the map.

But it is impossible to follow in detail the work of the multitude of explorers who, since 1860, have entirely changed the face of the no longer "Dark Continent."

The work of the great army of explorers during the half-century has changed the face of the continent and filled up the enormous blanks that disfigured the maps of 1860. While the outline of the coast remains as rigid as in the old maps, unindented by any of those great oceanic intrusions which mark the other continents, exploration has revealed a surface much more diversified than the geographers of two generations ago would have led us to expect; while the interior is mainly of a plateau character, the borderlands all round are more or less mountainous, with peaks rising in certain cases to heights approaching 20,000 feet. It has four great river systems and many subsidiary basins; a profusion of lakes, abundant forests, and park lands, and open areas that may be turned to the uses of humanity. Even the greatest desert in the world, the Sahara, has its mountain ranges and lofty plateaux, sometimes snow-clad. Unfortunately the abundant water-supply is not well distributed, though even the Sahara and the Kalahari have underground stores which may yet be utilised with good results. We have found that the continent is not nearly so hopeless as was believed from the standpoint of European settlement and enterprise. The white man has learned better how to adapt himself to tropical conditions, while there are many regions with altitudes that afford a climate in which the European can live in comfort and wholesomeness. Still, so far as we can see at present, the resources of the continent must be

developed mainly by native races under the guidance of their white brothers.

As to these white brothers, we must next consider the areas that have fallen to the share of the various European Powers. The scramble, which may be said to have begun when Stanley went out for the King of the Belgians to annex the Congo in 1879 and was virtually completed in 1886, has culminated in the absorption of the whole of the continent, except Abyssinia in the east and Liberia in the west. Britain has no need to be dissatisfied with her share, which now includes the whole of Egypt and the Egyptian Sudan. I have not ventured to add "Bothaland"; we must wait the result of the world-war, which will not be decided in Africa, but in Flanders or the Balkans. Britain's share amounts to three and a half million square miles with a population of fifty-three millions; France to four and a half million square miles, with a population of only forty-two millions; and Germany a million, with a population of twelve millions. The rest belongs to Portugal, Spain, Liberia, and Abyssinia. Of the total trade in 1914 Britain claimed £155 millions (of which ninety millions were exports) or two-thirds, leaving only one-third to the other Powers.

Much still remains to be done before our knowledge of the geography and economic potentialities of Africa can be regarded as adequate. A great network of routes and more or less provisional surveys have been laid down all over the continent, but the broad meshes between these lines have yet to be filled in. To accomplish this satisfactorily we require the services of specialists trained to scientific investigation in the various departments of science on which geography, in its broadest and highest aspects, is based, for it is only as all the raw material from all over the surface of our globe is brought together and systematically arranged that the geographical student will be in a position to work out the many problems, physical and human, with which his science has to deal.

I fear I must treat America with brevity. In the most popular American text-book of geography, a few years before our half-century, it was gravely stated that the Alleghanies of North America were the continuation of the Andes in South America. Half a century ago, much of the region west of Lake Ontario in the north and of the Mississippi in the south was the home of the Indian, the trapper and the buffalo. Canada consisted still of Upper and Lower Canada; Victoria on Vancouver Island was only a Hudson's Bay Company's post; and so was Fort Garry, now the great city of Winnipeg. Vancouver city did not exist. How Canada has since pushed westwards you all know. Winnipeg, Vancouver, and Victoria are flourishing cities; the whole habitable country has been more or less explored and mapped, partly by individual explorers, but mainly by the Canadian Survey; waving fields of wheat have taken the place of the rank grass of the prairie; great cattle ranches reach to the foot of the Rocky Mountains; coal mines are being worked in the east and west. The area of settlement and of agriculture has been pushed some degrees further north and north-west; the British Atlantic has been connected with the British Pacific by railways which make Britain independent of all foreign routes.

The caterpillar shading which indicated the Rocky Mountains from Alaska to California has given place to complicated ranges, with characteristic buttressing features, great plateaux with many offshoots, and beautiful coast ranges. All the vastly increased knowledge of Canada has led to the development of its resources at a constantly increasing rate. The whole country has been united into one great Dominion, divided into many provinces, in place of the Upper and Lower Canada of half a century ago. The population has increased from three millions to over eight millions, but Canada is capable of sustaining ten times that number. Over one hundred and ten million acres of land are occupied, and of this ten million acres are under wheat and an equal area under oats. The annual value of the mineral products alone amounts to about thirty million sterling, and of manufactures to two hundred and forty millions sterling, while the total exports approach closely to one hundred millions. I give these figures as affording some idea of the vast progress made by Canada in the half-century in expanding this great country and obtaining a knowledge of its resources. But there is ample room for still further exploration and development, and during the next half-century the progress achieved must be much greater than in the past.

What Canada has done in the north, the United States have done on a much greater scale in the south, naturally so, when one considers the difference in climate over the whole area. Not to mention the work of individual explorers, the survey men have penetrated into the remotest regions; have told a wondering world of the canyons of the Colorado, those one thousand feet deep gorges which are matchless specimens of nature's sculpture; of the gorgeous beauties of the Yellowstone Park; the witcheries of the Yosemité; the great deserts which the coast ranges deprive of moisture, and the Rocky Mountains themselves with their picturesque peaks and rich upland parks.

As a result of all this activity the whole of the three and a half millions of square miles of the republic has been occupied; with the exception of remote Alaska all the old territories have been organised into states; the population has risen from thirty millions to one hundred millions; excluding Alaska, thirteen hundred million acres of the total nineteen hundred million acres have been appropriated and reserved. These figures may afford some idea of the activity of the United States during the half-century in exploring its enormous territory and taking stock of its resources.

As to South America, it was in 1860 that Bates returned, after eleven years' sojourn in the Amazon basin, mainly as a naturalist, but with abundant fresh information on the geography of that enormous river basin. Since that time a host of explorers, British, French, German, American, Swedish, have penetrated into the recesses of the continent, exploring its multitude of rivers, climbing and mapping the great Andean range, investigating the interesting antiquities of the continent, studying its natives of many types, and reporting upon its resources. The Argentine and Chile, the two most advanced of South American States, have surveyed and mapped at least provisionally their extensive territories,

while boundary commissions have added much to our knowledge. The result is that the map of South America is very different from what it was half a century ago. Still, it must be said that more remains to be done in the way of pioneer exploration in South America than in any other continent except the Antarctic. At least a million square miles are practically unexplored, while a large area of the remainder is imperfectly known. In the northern basin of the Amazon very much still remains to be done. A vast extent of the great forest area of Brazil has never been penetrated. Major Fawcett in a recent exploration in the Bolivia-Brazil border came across a forest tribe that thought themselves the only people in the world, except a hairy tribe some miles away. In Venezuela, Colombia, Ecuador, and even in Peru and Bolivia great areas are all but unknown; even the interior of the Guianas have never been adequately explored; and very much remains to be done before the magnificent chain of the Andes can be regarded as sufficiently mapped. South America has been attracting increased attention in recent years, and it is to be hoped that in the near future serious attempts will be made to complete our knowledge of a continent teeming with features and races of interest, and the abundant resources of which are capable of vast development. Unfortunately the ruling classes in the more tropical of the republics seem to lack the energy to deal adequately with the tremendous task.

If now we turn to Australia we shall find that as much heroism, endurance and self-denial have been displayed in the exploration of the interior of that great southern continent as there has been in the case of Africa. Half a century ago we knew little more than the rim of the continent. Men could only wonder what lay in the unknown interior; was it picturesque mountains, flowing rivers, great lakes, luxuriant forest and pasture lands, or was it only a southern Sahara? During the last half-century the Australians have made the most strenuous and praiseworthy efforts to discover the characteristics of this great continent of which they are the stewards. All the Australian states have for years had well organised surveys at work, and New South Wales and Victoria are now fairly well mapped, and their features and resources known.

One of the great episodes in Australian exploration is the terrible disaster that befell the Burke and Wills expedition which, in 1860-61, actually crossed the continent from Victoria by the Stony Desert and the Mackinlay Range to the estuary of the Flinders river in the Gulf of Carpentaria; the two leaders paid for their zeal with their lives. Much more successful was Macdouall Stewart who, in 1862, after two previous attempts, crossed the centre of the continent from Adelaide to Port Darwin along the route now occupied by the trans-Australian telegraph line and the trans-continental railway now under construction. He brought back good news of fine ranges of hills, grassy plains and fair supplies of water, and altogether gave the Australians new hope of their continent. About the same time two other expeditions crossed the continent from north to south and south to north, in search of Burke and Wills, adding much to our knowledge of Queensland. The Stony

Desert of Sturt was found flooded with water, and all around its borders were rich pasture grounds.

The general result of the many exploring expeditions in the eastern half of Australia has been to show that while there are great patches of desert there are extensive areas of excellent country which would be as valuable as the finest land in Europe, if only the rainfall could be depended upon; but away from the coast you cannot expect ten inches a year; occasionally there may be more, but sometimes also much less.

Still about the western half of the continent nothing was known, though in the north and north-west various expeditions had found rivers and plateaux and hills, and the country in the immediate neighbourhood of Perth and along the west coast was fairly well surveyed. The first successful attempt to cross from east to west was made in 1873 by Colonel Warburton who, with his son, some natives, a few Afghans and a troop of camels, started from the centre of the continent and, crossing mainly between 20° and 22° south latitude, reached the De Gray river after terrible sufferings through want of food and water. Nothing marked their dreary way but a desert of sand-hills and spinifex, with here and there a scanty waterhole.

Since then the continent has been crossed and re-crossed in all directions by Forest, Giles and their successors. The discovery of gold in Western Australia led to further exploration of that territory and an influx of immigrants adding greatly to the scanty population of half a century ago. All these expeditions combined with the official surveys have afforded a fair knowledge of the main features of the interior, which are much more varied than was at one time supposed. At the same time the numerous rivers shown on the map in Central and Western Australia lack that permanency which is necessary for successful agricultural operations. But great schemes are on foot for irrigation and storage, and, as is known, the immense underground supply of water has been tapped, though, as it is not unlimited, its use ought to be carefully regulated. The population during the past half century has trebled, and the material progress during recent years has been so great that the Imperial Government felt justified in combining the various colonies into one great commonwealth. Under this new regime there is no doubt that a much more detailed exploration of the continent on scientific lines will be carried out in future, with beneficial results on its development, mineral, agricultural, pastoral and manufacturing. In the annual production and commerce of the Commonwealth, gold has ceased to be the most important factor. The agricultural production alone amounts to about fifty millions sterling, the pastoral to close on sixty millions, while dairying products yield twenty millions and manufactures fifty-eight millions. Mining products amount to some twenty-five millions. The total exports are now almost eighty millions, and of that, wool alone is valued at over twenty-six millions.

This will afford some measure of the extent to which Australia has been explored during the past half-century. When we remember what man has been able to accomplish in older countries by tree-planting, irrigation and other judicious methods, there is no need to despair of

Australia. At the worst there is plenty of room for the hundred millions which it is estimated—by Australians—will be the population of the continent a century hence. We may be sure there is a great future in store for our southern dominion with British energy to make the best of geographical conditions.

Although New Guinea, especially the spacious western section belonging to Holland, remains one of the few regions which affords ample scope to the adventurous pioneer explorer, still, much has been done in recent years to furnish a fuller knowledge of its interior, especially since the narrower eastern section was annexed by Great Britain and Germany. Half a century ago it was practically a blank. Into the discoveries that have been made in that magnificent archipelago that fringes south-eastern and eastern Asia, I cannot enter. Much has been done in the Philippine Islands and in Formosa by the United States and Japan to which these islands now belong. Though many additions have been made to our knowledge by British and Dutch explorers in the other islands of the great Asiatic archipelago, still much remains to be accomplished especially by the scientific explorer.

As for New Zealand its exploration during the last half century has been carried on mainly by its well-organised survey, so that it is now to a large extent well mapped, while the peaks of its picturesque mountain ranges have been ascended by many Alpinists, with the result that the map of what is now the Dominion of New Zealand is very different from that of half a century ago. The development of its resources has kept pace with the progress of exploration, so that the value of its exports have reached the amount of £23,000,000, mainly wool, agricultural and dairy produce. The population has grown from a few thousand in 1860 to over a million.

As for the great continent of Asia itself, the primitive home of the human race, according to some, and therefore the longest known of all the continents, I can barely touch it. Unlike Australia and the New World, its great features, its matchless mountain systems, its magnificent rivers, its spacious table-lands, its sandy deserts, have long been known in their main features. But during the last half century very much has been done to fill in the details of these features, and give them precision. War and conquest have here been the great handmaids of geography. In our own great Asiatic dependency, India, we have acted on the wise principle that to govern a country well, you must know it well. One of the greatest enterprises ever undertaken by any Government has been brought to a completion during the half century. Nothing is more creditable to us in our connection with India than this great Trigonometrical Survey, begun about a century ago and completed quite recently. We have measured every mile of the country; we have plotted all its mountain systems, laid down the courses of its mighty rivers, mapped its deserts and its forests and its great alluvial plains, which now form one of the great wheat granaries of the world. Many of the towering peaks of the Himalayas have been measured in their heights, and some of them scaled, and those grand glaciers, which the great Humboldt declared could not exist, have been explored and mapped;

the meteorology of the peninsula, on which so much depends, has been and is being worked out on a magnificent scale, while the Geological Survey has done much to unriddle the past history of India, and reveal its mineral treasures. Our wars with Afghanistan have enabled us to map partially at least that troublesome country. Our explorers, some of them native Indians, some of them Britons of the fine old adventurous type, have faced many dangers, penetrated into nearly every corner of Central Asia, and brought back treasures in the way of knowledge. But all round our Indian borders our modest military expeditions have always been accompanied by surveyors, British and native, who have generally returned with a rich harvest of geography. Only quite recently the age-long problem of the Sanpo-Brahmaputra has been all but solved by the enterprising son of the Society's late Secretary, Captain Eric Bailey, when some thousand or two square miles of the region were surveyed and mapped. Burma and the Malay States are being surveyed; Siam has been mapped, while similar services are being rendered by France in the territories under her domination. Partly through the enterprise of individual travellers, and partly as a result of Sir Francis Younghusband's expedition, Tibet and Lhasa are no longer the mysteries that they were, and the great Brahmaputra has been traced to its source. Our faithless friend, Sven Hedin, confirmed the existence, and explored the great range beyond the Himalayas conjectured to exist by Trelawney Saunders as far back as the seventies. But I cannot attempt to record the work of individual explorers. The High Pamirs have been fully mapped. The Kuen Lun, the Tian Shan, and these other great ranges that lie between Tibet and Turkestan and southern Siberia have been plotted in their main features. The Gobi, the Takla Makan, and other desert regions have been explored, as has the Tarim basin and the shrinking lakes scattered about in the Eastwards, while many of the marvellous remains of ancient cities and towns have been discovered. The upper courses of the great rivers, the Huang-ho, the Yangtse-kiang, and others flowing to the south, that rise in the region of the north-east of Tibet, have been approximately mapped. Progress has been made in the accurate mapping of China, though much still remains to be done in this interesting land. Japan has been as well mapped as India. Our knowledge of Mongolia and Manchuria have been greatly increased; this has also been the case with Siberia, through the surveys for the Trans-Siberian railway which has made it possible to reach Japan and Pekin in about a fortnight from London. Southern Siberia itself, it has been found, may compare with Canada as a wheat-growing country. In central and northern Siberia much still remains to be done, especially in connection with the hydrography of its great Arctic-flowing rivers. To the ever-progressing conquests of Russia we owe much of our knowledge of Central Asia. Half a century ago her borders scarcely extended beyond the Caspian shores. Little by little her explorers travelled, east and north and south, followed by her armies, until she marches with China, and is within measurable distance of India. The ancient Oxus has been traced to its source, though problems remain in connection with its old channels and the fluctuations of the Aral and

Caspian, and the conditions of ancient civilisation in these regions. We know a good deal more about Persia than we did half a century ago, though there is much room here for the investigations of the qualified explorer, especially as to the present and past conditions of the Lut desert. Just half a century ago Palgrave succeeded in crossing Arabia. Various explorers have been at work since then in the west, the north, and the centre. Quite recently it was crossed again in the opposite direction from Palgrave's route by Captain Shakespear, who, alas, a few months ago laid down his life in the interests of the Empire. But for the pioneer Arabia still presents a fruitful field, especially in the great south-eastern desert, which is practically unknown. While Palestine has been adequately surveyed and accurately mapped by the Palestine Exploration Fund, and much geographical and archæological work done in the rest of Turkey-in-Asia, there is much of interest still to accomplish here by the well-trained explorer. While, therefore, the map of Asia has to a large extent been reconstructed during the last half-century, it has, with certain exceptions, been mainly the work of pioneers. There is ample room for accurate work all over the continent, especially with the various historical and economic problems dealing with the distribution and grouping of different physiographical and animate types, in which Asia abounds perhaps more than any other continent.

It is more than half a century ago since Mrs. Hemans asked the question,

> "What hid'st thou in thy treasure caves and cells,
> Thou hollow-sounding and mysterious main?"

The question has been answered to a large extent by the deep-sea researches of the last fifty years, and on the basis of these researches a new department of science has been created under the name of Oceanography which has now plenty of work to do. There have been numerous expeditions whose main purpose has been to explore the ocean from its surface to its deepest depths, but undoubtedly the greatest of them has been that which for three years sailed all over the oceans in Her Majesty's ship *Challenger*. The ocean has now been sounded in thousands of places, specimens of its bed have been brought up and analysed; its denizens have been captured and brought to the light from all depths; its saltness and its temperature have been tested in all quarters of the globe: its surface and under-currents have to some extent been charted, and in every way it has been subjected to the never-satisfied curiosity of humanity.

It would be hopeless for me to give you anything like a satisfactory summary of the results.

As to depths I may say that the average depth of the Pacific is something like 15,000 feet, and of the Atlantic 12,000 feet. The greatest depth yet found in the Pacific is 31,614 feet off the Marianne Islands, while in the Atlantic the deepest trustworthy sounding is 27,366 feet near the Virgin Islands. The waters of the ocean seem to be in a state of constant circulation, cold under-currents coming down from the Poles, and warm surface current going south and north in return. One of the

FIG. 1. The World in 1860, showing extent to which it had been surveyed at that date.
(From a map kindly supplied by Mr. E. A. Reeves, Map Curator, Royal Geographical Society.)

Fig. 2. The World in 1915. For key see Fig. 1.

(From a map kindly supplied by Mr. E. A. Reeves, Map Curator, Royal Geographical Society.)

best known of these great ocean currents is the Gulf Stream, about the regime of which popular ideas have had to be considerably modified. As to the distribution of life in the ocean, researches of the *Challenger*, and other similar expeditions, have disclosed thousands of new forms in all seas, and at all depths of the ocean. There does not seem to be any part of the open ocean so deep, so dark, so still, or where the pressure is so great as to have effectually raised a barrier to the invasion of life in some of its many forms. Even in the greater depths many divisions of the animal kingdom are represented.

We have had revealed to us from these hidden depths great broad valleys, spacious plateaux, gently undulating ridges rising here and there into mountains, whose peaks overtop the water in the shape of the islands that stud the bosom of the sea, with here and there precipitous gorges covered with the debris of the myriads of animals that have found a home and a grave in those waters during untold years.

I need hardly remind you that the many island groups which stud the bosom of the spacious Pacific have, like Africa, been parted among the Powers of Europe, as well as the United States, with the result that much has been done to add to our knowledge of the islands and their vanishing peoples.

The accompanying maps will show roughly by different tints the progress which I have tried to outline in the exploration of the globe during the half-century. (Figs. 1 and 2.)

The raising of the standard of geography during the last thirty years, and the increasingly rigid application of scientific method to geographical research and to the practical application of its results, has had considerable effect on the organisation and equipment of exploring expeditions, and of the type of men selected to carry out exploring work. So long as a great part of the world was very much of a blank we welcomed any authentic information that could help to fill it up, even although the explorer was a pioneer without any special training. But now that the main features have been filled in with varying degrees of accuracy, we must insist that explorers shall have a training adequate to the conduct of their work on scientific lines. Dr. de Filippi's recent expedition to the Karakoram may be taken as a model of what the expedition of the future should be, with its ample staff of specialists in every department of science involved in the work the expedition had to accomplish, and its complete equipment with the latest instruments necessary to give the most satisfactory results. But this condition has been increasingly recognised in recent years.

This is the place to refer in a word to the great service rendered to exploration, and to geography in general, by photography since it began to be applied to this purpose. The old wood-engravings, and even plates, which were used for illustrations in the pre-photographic days, while sometimes wonderfully good from the artistic, and even from the geographical standpoint, could seldom compete in the latter respect with the photographs taken by a discerning eye. I remember well the difficulty in persuading some of the more conservative members to permit the introduction of lantern slides at the meetings of the Royal Geographi-

cal Society as being too trivial and too childish for a serious scientific body: I need not remind you of the universal use now of this method for scientific lectures of all kinds.

One other feature which has marked the development of geographical work during the half-century might be pointed out. Fifty years ago geographical enterprise was the work of individual explorers, sometimes backed by their governments; but in recent years a remarkable circumstance in geographical method has been the growth of international co-operation, as shown in the international congresses and international bodies, such as the International Geodetic Association, the International Meteorological Committee, the International Council for the Study of the Sea with special reference to fisheries; the international map of 1 : 1,000,000; and the great bathymetric map of the Oceans undertaken by the Prince of Monaco with an International Committee.

I have thus endeavoured to present to you, I fear in a very summary fashion, the results which have been achieved during the past half century towards the completion of our knowledge of the home of the human race. I think you will admit that so far as results are concerned it will compare favourably with any other half century in the history of exploration. I have had necessarily to confine myself to what I may call the superficial results of all this activity. But apart from the fact that vast areas of previously unknown lands have been brought within human ken, and provisionally mapped, abundant additions have been made to all the aspects that come within the sphere of geography. Many departments of science have profited by these explorations—the character and distribution of physical features, of minerals and vegetation, of animal life, of climatic and economical conditions, of man himself in his various races and varieties. Of some of the results of all this knowledge you may have been able to form some idea from the figures I have given as to the growth of the population and the greatly enhanced value of the results of economic development. For the more detailed and precise is our knowledge of the habitable lands of the globe, the more are we in a position to turn them to the best account for the benefit of humanity. As I have pointed out there is still a certain amount of pioneer work to be done, especially in South America, but the explorer of the future must be very differently equipped from the pioneer of the past. Something more is wanted now than a daring spirit and a geographical instinct. What we now want, even for pioneers, are men who have been thoroughly trained, and who will be content to devote themselves to a limited region, and work it out in all its details of feature, and geological character and meteorology, and animals and plants; ever keeping in mind that man is the centre of all, and that we only reach the last stage of the problem when we have worked out the action and re-action that is constantly taking place between man and his topographical surroundings. If in the solution of such problems as these there is as much activity shown in the next fifty years as there has been in the past half century in the work of pioneer exploration, there will not only be an unprecedentedly rich harvest for science, but also, I venture to think, magnificent results bearing on the

social and individual welfare of man, who cannot but benefit from a better knowledge of his geographical settings.

In the vast amount of the work of exploration during the half-century, the British Empire, I think, may claim the lion's share.

> "We sailed wherever ships could sail,
> We founded many a mighty State.
> Pray God our greatness may not fail
> Through craven fear of being great."

I fear I have left little time to deal with the other two sections of the subject—the progress that has been made in raising the standard of geography as a department of scientific research, and the improvements that have been introduced into geographical education. Until about thirty years ago I fear geography was not treated seriously in either of these aspects. Long before that, in the early seventies, attempts were made by the Royal Geographical Society to induce the Universities to recognise the subject in their curricula: but the Society was politely flouted: the subject, we were assured, was beneath the dignity of University recognition, and was only suited for elementary schools. At this we need not be surprised when we examine the geographical literature of the period. It is true, that in certain of our great narratives of exploration—Franklin, Ross, Darwin, Bates, Wallace, Livingstone, and others—the scientific side of the subject was dealt with seriously, but the few works which existed on general geography were entirely descriptive: no attempt was made to show the relations which existed between the various distributions over the earth's surface and the interaction between these and the human beings who had to adapt themselves to the geographical conditions or modify them for the benefit of humanity.

In 1884 the Royal Geographical Society decided to make a thorough inquiry into the position of geography at home and abroad; and with the results of this inquiry they again approached the Universities, this time happily with success. Schools of Geography were established at Oxford and Cambridge, and in time lectureships in the subject were instituted at the Universities of Edinburgh and Glasgow, London, Liverpool, Manchester, Birmingham, Reading, Sheffield, Aberystwyth. It was just before this that the Royal Scottish Geographical Society was founded, with branches in Glasgow, Dundee and Aberdeen, followed at intervals by similar societies in Liverpool, Manchester, Newcastle, Leeds, Southampton. Thus geography was raised to an altogether different platform in this country from the lowly position she had previously occupied: she was placed on a level with the subject in Germany, though that pushful country had the start of us by many years, as she has had in other directions, and a long leeway has to be covered. But we have been making headway. Apart from the purely educational work carried out by the Universities, a beginning has been made in the work of geographical research. Both at Oxford and Cambridge, at the London School of Economics, and I believe at Edinburgh and Glasgow work of this kind is encouraged. On the University

programmes we have such heads as the Principles of Geography; Survey of the Natural Regions of the Globe; Land Forms and the Morphology of the Continents; Meteorology, Climatology and Oceanography; Human Geography in its various phases; Geographical Methods of Notations, and so on. To the University tutor, the schoolmaster, the text-book compiler of thirty years ago, most of this would have been an unknown tongue. Examples of what may be regarded as geographical research work have been forthcoming from trained men like Mill, Mackinder, Chisholm, George Adam Smith, Herbertson, Grant Ogilvie, Roxby, Miss Newbigin, and others on this side, and by Davis, Huntington, Miss Semple, Brigham, and others in the States, which may be said to have been inspired from the mother country. Much good work has been done by the various students in the geographical distribution of vegetation in this country. As samples of scientific exploring work I might refer to Sir John Murray's investigations of the Scottish lochs, Mill's survey of a region in Sussex, Günther's researches on the Italian coastline, Hogarth, Ramsay, and others in the Near East, Willcocks in Mesopotamia, Filippi, Stein, Carruthers, and Huntington in Central Asia, Hamilton Rice in South America, Scott, Shackleton, Bruce and Mawson in the Antarctic. All this is a good beginning, and there is every reason to hope for still further work of this kind in the future, if those responsible for geography at our Universities will do their duty.

You still find some scientific men in England who deny that geography is a science or can ever be a science, because for one thing it is a *graphy* and not a *logy*. It is remarkable if geography is the one thing in the universe that cannot be dealt with on scientific methods, producing a body of knowledge as systematically arranged as that included under geology, meteorology, astronomy, or engineering, and other sections of the British Association. Personally, it does not irk me whether geography is admitted to be a science or not. It is a department of investigation which deals with a field untouched by any other department—the earth as the home of humanity. Like other departments of inquiry, it can collect its facts and draw its inferences on scientific methods, with results which in many cases could be cited in the geographical output of Germany, and happily, as I have stated in a few instances, in our own country—of the first importance towards the solution of problems intimately associated with human life and activity. To quote from the Anniversary Address, in 1892, of the late Sir Mountstuart Grant Duff, President of the Royal Geographical Society: "Whether it is taught or not taught in schools and universities, geography must in the nature of things rule the territory in which the sciences relating to organic life, from history down to the structure of the humblest animate thing, meet the sciences which have to do with inorganic nature. Call it a *graphy* or a *logy*, or a *Kunde*, or what you please, it remains the body of knowledge which has to do with the theatre of the activity of man, and all things that have life. We may stunt and injure the activity of the next generation by refusing to teach it, but eventually it must obtain the position which the greatest

of living systematic botanists, Hooker, claimed for it in 1886. 'It must permeate,' he said, 'the whole of education to the termination of the university career, every subject taught having a geographical aspect.'"

With such authorities as these on our side, we have no need to be ashamed of the work our science has performed in the past and is capable of performing in the future. In this country, we are comparatively new to the work, only feeling our way, as it were, only trying to find out exactly what are the conditions under which our line of research will produce the best results, what are the limits within which we must work. It is true that geography is the mother of all the sciences, and though her numerous children have long ago set up for themselves, still she has more or less intimate relations with many of them. All the same, she must not be too grasping; she ought to form a clear idea of what she has a right to, what are the limits of her field of operations. To vary the simile, the geographers in this country have been moving into a much more spacious mansion; we have hardly had time to put our house in order; we may find when we do so that we have not room for all the furniture that some of our friends would like to squeeze into it. Anything like overcrowding is unnecessary and would be embarrassing. Ellsworth Huntington, one of the most active and most original of our younger geographers, whose imagination may perhaps want a little of the taming that comes with years, has the fullest belief in the influence of geographical conditions on history and other human activities; but he maintains that the claims made in this respect are often too vague to convince the sceptical historian. What we want, he says, is a more precise statement as to the nature and amount, the quantity and quality, in each case of this environmental influence compared with various other elements. Probably we can never reach mathematical precision in this respect, as we might do in other departments of our subject; but it would be a splendid exercise in geographical research and in mental training for the qualified student of the subject to tackle the problem in certain specific instances. A group of physical features might be taken—say the Alps, or the Himalayas, or the deserts of Central Asia, or the Sahara—and the question of their control over human distribution and human activity worked out with as much precision as possible. Or a particular country or region might be selected and the control which geographical conditions have exercised on its history and development, as compared with other factors in the problem, be indicated.

As to the progress which has been made in geographical education outside the Universities during the period, let any one who is old enough recall the text-books of thirty years ago with their dreary list of names and little more,—names of capes, names of bays, names of mountains, names of rivers, names of lakes, names of towns, all completely isolated, as if they had no sort of relation to each other, nor to human beings who had to live and move and have their being among them. We had such tags as Edinburgh, Leith, Portobello, Musselburgh and Dalkeith, all on the Firth of Forth; London on the Thames; Colchester on the Colne, famous for its oysters; Peterborough on the Nen, near which is

Fotheringay Castle, where Mary Queen of Scots was cruelly beheaded, and suchlike items. No wonder that geography was rejected and despised by the Universities if this kind of thing was all it had to say for itself. Then there was the featureless atlases and wall maps, the value of which was estimated mainly by the number of names which they contained. Pictures, photographs, stereos, the lantern, were regarded as too childish to be used for serious educational or scientific purposes; while as for the many other appliances now available for geographical education, no one seems to have thought them possible. Out-of-door work in those days was undreamed of.

Need I remind you of the change in all these directions which has taken place during the last thirty years? Contrast the conditions then and now. It might seem invidious if I referred to any particular text-books or treatises, or maps and other appliances. I am sure it is unnecessary before an audience like this. The ever-increasing series of treatises and text-books which are being produced, and for which, therefore, there must be a demand, are no doubt familiar to you all. Some may be open to criticism, but all, from the most bulky and elaborate down to the modest elementary text-book, are on a totally different plane from those of thirty years ago.

But text-books and maps are not everything in geographical teaching, and happily in some of the Universities, and in a considerable number of secondary and even elementary schools outdoor work is carried on.

Geography, like geology, has to deal with a concrete earth, and not merely with maps. It has surface features of all kinds to investigate, and the life that is lived amid these features, and is to a considerable extent conditioned by them. It is the duty of geography, as it is of geology, to investigate these conditions on the spot, and to work out the problems suggested by them. This department of geographical work is still in its infancy, a mere collection of local facts and statistics is not enough; co-relations ought to be investigated and deductions as precise as possible made as to the results of the interaction of the various factors.

A new epoch in the history of geographical education in England may be said to have begun when the Board of Education issued its Regulations for the Teaching of Geography in Secondary Schools. Perhaps the most important point in the new regulations was that a definite number of hours a week—not less than two periods of school work and one of home work—were to be allotted to geography in secondary schools. Provision had to be made for a four-year course of the work, and the course had to include the geography of the whole world, so that the custom of keeping the pupil at work on one or two particular continents, according to exigencies of examinations, until he left school was discountenanced. Particular attention was given in the Board's circular to the importance of practical exercises, such as "worked out problems, together with original maps and plans," in geographical instruction. Consequence had to be connected with cause, and reasons had to be stated with facts, instead of presenting lists of place-names, rivers, communications, and so on, as catalogues to be learned without being understood.

When the Board's Regulation were issued, teachers who had specialised in geography were few, and the Regulations would have been a long time coming into practical effect if suitable manuals had not been forthcoming. The Board defined the spirit of the teaching it desired to establish, and gave the outlines of a scheme, but it left the actual working-out to the teachers themselves; and in most cases they had to obtain their guidance from manuals and text-books. Much had already been done by the University Extension Lectures to teachers. The teaching of the subject throughout the country now underwent a change on account of the new conditions: from being classed as memory-work which could be put into the hands of any teacher, geography became a reasoning subject requiring individual work by the student and sound knowledge by the teacher as much as any other subject taught on scientific principles. Too much attention was perhaps paid at the outset to the working of practical problems and exercises, but this has now righted itself, and the human note is not forgotten while the scientific method of arriving at it is followed. What is more important than anything else is that the standard of work in geography is steadily rising. The subject is being treated more and more on a regional basis, and the work is consequently gaining in intelligence.

The programme for instruction for elementary schools has been greatly improved on the best lines, and where teachers have been adequately trained to deal with it intelligently the results are a great advance on what passed for geography thirty years ago. But in the case of the younger pupils, I fear it is difficult to get them to do little more than to read narratives. In the upper classes of these schools, however, more systematic work is prescribed in the official programme, and I believe the whole tendency is towards an improvement upon the methods and outlook of previous years. The Inspectors of the Board of Education consider that geography is now on a much better footing than it was, and is often intelligently taught. Much depends upon the training which students in Training Colleges receive before they are turned out to carry on the work of education.

In certain institutions facilities are provided for Training College students going through a course of instruction in geography, with opportunities of actual practice in schools. I am not sure that this method is quite satisfactory; it would be well if all Training Colleges were as fully equipped for geographical work as they are in other departments. In no class of school can geography be satisfactorily taught on modern lines unless the teachers are as seriously trained in that as they are in grammar, arithmetic, or any other essential parts of their course. In certain Training Colleges the subject is in charge of geographical specialists. This ought to be the case in all Training Colleges, as well as in the Universities from which the supply of teachers for secondary and higher schools are drawn. But if the progress is as marked in the next quarter of a century as it has been in the past, there can be little doubt that the existing deficiencies will be removed, and geographical education will be on as satisfactory a footing in Britain as it is in Germany.

But time forbids me to go further. I hope I have succeeded in showing that during the last thirty years geography has grown in stature and in strength in this country; that, in fact, it has reached man's estate, and that both in education and in research it is trying to do a man's work. It has still much to learn that can only come by experience, but it is bound to come if we work in the future as in the past, and that all the more rapidly and successfully in proportion to the increasing number of workers. The Royal Geographical Society has itself extended not only in numbers, but in varied activities, during these years. Its staff has been quadrupled to keep pace with its work; the scientific side of the subject receives more and more attention. The efforts of the parent Society are effectually supported by those younger Societies which have grown up in various great centres. It is often stated that the work of Geographical Societies is nearly completed, that they will soon have had their day and cease to be, for the world is being rapidly explored and mapped. There is plenty of work still to do in exploration and mapping, and when that is complete the real work of geography and Geographical Societies will only begin. The explorer and map maker only lay down the foundations of the subject; it will remain for generations of geographers to rear thereon a stately structure fitly representing "the kingdoms of this world, and the glory of them."

MACEDONIA: THE BALKAN STORM CENTRE.

By Marion I. Newbigin, D.Sc. (Lond.)

(*With Sketch-Maps.*[1])

In the issue of this *Magazine* for June last (p. 281), the geography of the Balkan Peninsula was discussed in its broad outlines, with special reference to the various peoples. Since that article was written Bulgaria has joined the Central Powers, and fresh campaigns are being carried on throughout the peninsula. Bulgaria's action was especially motived by her desire—or at least that of her ruler—to make good the losses which she sustained in the Second Balkan War, and as these losses were from her standpoint most important in Macedonia, the Bulgarian campaign, like so many Balkan combats, is chiefly concerned with that storm-centre of the whole peninsula. It seems desirable, therefore, to supplement the previous paper by a more detailed account of the geography of Macedonia, and of those facts in its recent history which have a geographical bearing.

The general descriptions given in the previous paper centred round the modern conception of the Balkan Peninsula as a region containing three main structural forms, the marginal folded mountains, the central

[1] In reading this paper reference should be made to the orographical map which appears in the June issue, and also to any of the war maps of the Balkan area. Only the more general points can be shown on sketch-maps of the scale of those in the text.

upland, and the intermediate belts between the two. According to this conception, Macedonia, with Old Serbia, constitutes the western intermediate belt, characterised by its combination of hills and mountains, with intervening depressed areas or basins, the last containing the chief settlements. It may, however, be very naturally objected that this point of view is difficult to fit into the older one, according to which Macedonia is a virtually mountain-encircled land, forming a geographical unity. This second view is not only to be found in most geographical books of reference, but it has the further interest that it has been till recently implicit in most diplomatic and political discussions of the country. But modern geographers and local politicians have alike abandoned the older view. The question, Are they justified in doing this? becomes then one of great interest. In attempting to answer it in the affirmative we shall begin by giving a description of the country on the older lines.

We may begin with boundaries. Most books of reference give these more or less as follows. Macedonia is the tract of land bounded to the south by the Ægean and by the Greek frontier before 1912, that is, broadly speaking, by the mountains which confine the plains of Thessaly to the north. The western boundary is formed by the Grecian and Albanian folded mountains, especially by the northern part of the Pindus range and the Grammos group. The last named may be regarded as continued, under various names, into the Shar Mountains, which curve round to the east and thus form the north-west boundary. The north-eastern boundary is formed by the slopes of the Rhodope upland, which approach the Ægean near Kavala, so that a line through this town forms a better eastern boundary than that of the river Mesta, the frontier often given. The boundaries so defined leave a gap, only partly filled by the Tzerna Gora Mountains, between the Shar Mountains and the central upland, but otherwise they have, at least on paper, a certain satisfactoriness. But even at this stage we may note that the western mountain wall, theoretically complete, has some gaps in it which the diplomatist, trying to draw satisfactory boundaries, will regard with distrust.

The next point is to consider the outlines of the geography of Macedonia as thus defined. As an aid in this task we reproduce, with some modifications, Fischer's diagram of the country from the Danube to the Ægean, which includes both Serbia prior to 1912 and Macedonia as just defined (Fig. 1). This may seem to represent a singularly well-balanced tract of country. Serbia is seen to consist first of a hill country sinking to the Danube, and second of a mountain belt sloping up to a central watershed. Beyond this watershed we have the Macedonian mountain belt, which, further south, sinks into a Macedonian hill country opening to the coast by the plain of Salonika. In both cases, in hill country and mountain belt alike, basins, which are mostly fertile, occur, especially along the courses of the rivers. The elegant simplicity of the scheme is somewhat marred by the fact, which is suggested indeed on the map itself, that the valley in which the Vardar runs for most of its course is continued over the central watershed into that in which the Ibar

flows. In other words, in one place at least the watershed is so low that natural lines of communication make nothing of it, and intercourse is thus easy between Macedonia and what used to be Old Serbia to the north-west of it. Further to the east, again, the watershed between the

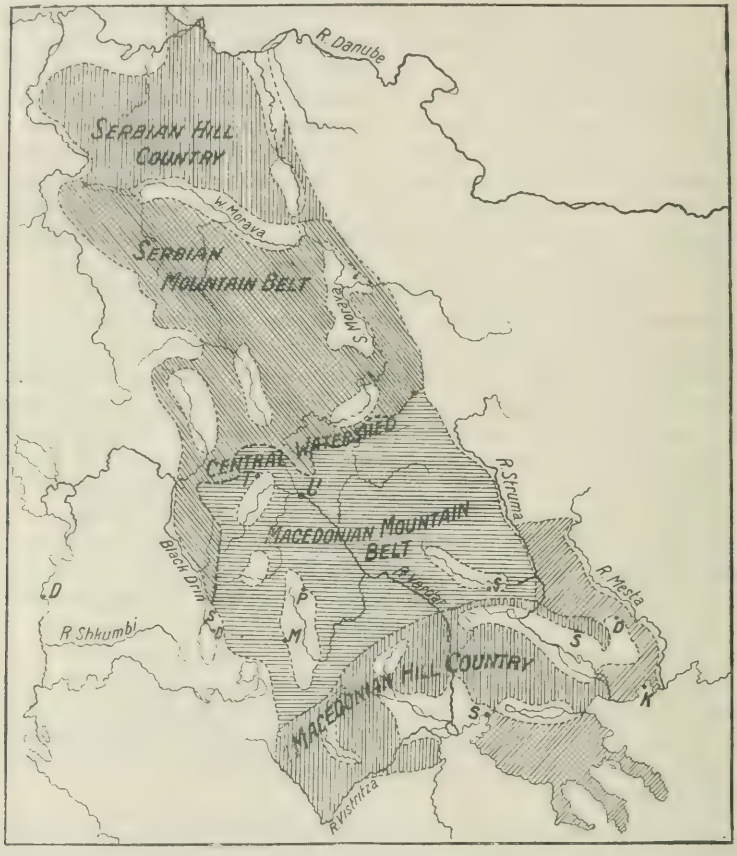


FIG. 1.—The Relation between Serbia and Macedonia, according to Fischer.

The chief basins in Serbia, Old Serbia and Macedonia are shown, and the more important towns in Macedonia are indicated by initials. Beginning in the SE. note the double basin of Seres and Drama with these towns and the adjacent Strumnitza basin, then the plain and town of Salonika. NW. lies the basin of Monastir containing that town and Prilep, with the lake country, containing Struga and Okhrida, to the west. Further N. is Uskub, with the Tetovo basin to the west.—(*After Fischer with modifications.*)

Morava and some of the factors of the Vardar is poorly marked, leaving a gap here also in the supposed mountain wall.

Leaving these points for the present, we may note that Macedonia as here shown is characterised by four important river systems. The Vardar flows through the whole country and divides it into an eastern

and a western half. Further south, in western Macedonia, we have the Vistritza, with a curious bend upon its course. In eastern Macedonia the Struma is the most important stream, the Mesta being of less interest. Apart from the four rivers the most important physical feature is the western group of lakes, including Lakes Presba and Okhrida, with some smaller half-silted-up bodies of water to the south of them. They lie close to the south-western frontier, on the confines of Albania.

The Vistritza and the Vardar approach one another closely at their mouths, the two being only some six or seven miles apart where they enter the Ægean. The waste carried by the two rivers has been deposited to form an extensive plain, the Campania of Macedonia, and Salonika, the great port, may be said to have a relation to the mouth of the Vardar resembling that which Marseilles has to that of the Rhone. Similar but less extensive plains occur in connection with the Mesta and Struma rivers, those at and near the mouth of the Struma being especially important. Of the features of the coastline the most important is the digitate Chalcidic peninsula, which bounds the Gulf of Salonika to the north-east. Its base gives shelter to that port. Kavala, further to the east, is protected in somewhat similar fashion by the island of Thasos, while Rendina or Orfani has an open roadstead (cf. Fig. 2).

In considering next the site of the chief settlements in Macedonia it is important to bear in mind that these are, with few exceptions, placed —(1) along the Vardar line, or (2) on the Struma line, or (3) in the district of the western lakes, including in this designation the Pelagonian plain, or basin of Monastir, which lies to the east of the lakes.

The two main lines of communication through the country are, first, that which follows the Vardar valley, and second, that, as yet only partially traversed by a railway, which runs from the Adriatic coast past the north end of the lakes to Monastir, and from there by Florina, Ostrovo, and Veria to Salonika. A railway is as yet present only in the section from Monastir to Salonika, but the latter town owes much of its importance to the fact that it stands at a natural crossing-place of a north-to-south and an east-to-west route, for the route just described as coming from the Adriatic coast and Monastir runs along the coast to Constantinople and beyond. Broadly, we may say that lines drawn from Uskub to Salonika along the Vardar line, and from Struga or Okhrida by Monastir to Kavala would pass through or near all the important towns of Macedonia. But Uskub is important largely because of its connection by rail on the one hand with Nish and Belgrade, and on the other over the "central watershed" of Fischer to Mitrovitza on the northern border of Old Servia. Similarly, Struga and Okhrida are important because of their connection (as yet only a possible connection, for the Via Egnatia of Roman times has sadly degenerated) with the Adriatic, and Kavala because it is a port not far from the Salonika-Constantinople railway line. Thus even at this stage the conception of Macedonia as a geographical unit seems to be breaking down, and yielding place to one which suggests that it is chiefly a transit land.

The next point is to consider the rivers in relation to the basins

connected with them and to the settlements placed upon these. We may begin with the Vardar as the most important of the river systems. Like so many of the Balkan rivers it has a very anomalous course. Its headwaters take origin from the north end of the Bistra Mountains, at a point almost directly north of Lake Okhrida, only some forty miles from the town of Struga. The direction of flow is at first nearly east, then north-east through the basin of Tetovo or Kalkandelen, then south-east through Uskub, and south-east to south to the Ægean : the changes in direction are noteworthy (cf. Fig. 2).

The most noteworthy tributaries are, on the left bank the Pshinia and the Bregalnitza, and on the right bank the Tzerna. The Pshinia enters the main stream some twenty miles south of Uskub, and before its junction helps to bound the swampy plain lying to the south-east of that town. The headwaters of the Pshinia approach closely those of the Struma in the Rhodope upland, and there is here an important line of advance from Sofia to Uskub, one of the lines taken by the Bulgarians in October last. On the Bulgarian side there is a railway from Sofia to the frontier *via* Kustendil. No railway is present on the Serbian side, but there is a good road, *via* Egri Palanka, to the town of Kumanova on the Nish-Uskub railway. It will be remembered that the places named have figured conspicuously in war bulletins recently. The Bregalnitza is also connected by a road to the Struma valley, and marks another line of advance from Bulgarian into Serbian territory.

The third considerable tributary of the Vardar, the Tzerna, has a remarkable course, suggested on Fig. 1 and shown also on Fig. 2, which is important in connection with Macedonian problems. The river rises in the central knot of mountains between Uskub and Monastir, and flows with a generally southern direction through the important Pelagonian plain. At the southern end of this plain it turns suddenly upon itself at a right angle, and flows in a north-easterly direction to join the Vardar near Gradsko. In this north-easterly part of its course it flows through difficult country, and here its valley is virtually useless as a line of communication. In consequence the most convenient connection of the plain, and thus of Monastir its chief city, with the Vardar valley is southwards and then eastwards by Florina, Ostrovo, and Vodena to the plain of Salonika, the direction followed by the Monastir-Salonika railway. In other words, though hydrographically Monastir and its plain belong to the middle Vardar valley, actually their easiest connection with that valley is by means of the town of Salonika : easiest that is because here only is there railway connection. But there are, nevertheless, also roads to Monastir from the north-east and north, and these have great strategic importance.

In the first place, we have to notice that near Veles, some fifteen miles north of Gradsko, the Vardar receives from the south-west a small tributary, the Babuna, which permits of relatively easy access, by the pass of the same name, to the town of Prilep, at the north-eastern end of the Pelagonian plain, or basin of Monastir. From this town, Monastir, on the western margin of the plain, about half way down, can be readily reached. Prilep can also be reached by a road direct from Gradsko. It was by the Prilep or Babuna pass and hill paths in its vicinity that the Serbs

FIG. 2.—Sketch-map of Macedonia to show the chief river systems and the more important towns.

made their attack on Monastir during the 1912 Balkan War, and here fierce fighting has also taken place in the present campaign, when the Bulgarians attempted the same line of attack in their turn. On the other hand, the unsuccessful Greek attack on the same much-contested town in 1912, an attack of which we shall say something in a moment, was made from the south, and failed.

In the case of the Serbs, while one army advanced from Veles, another supporting army made its way from Kalkandelen, in the basin of Tetovo or Kalkandelen, by a road which leads directly across the hills to Monastir. There are still other lines of approach from Uskub. Thus Monastir, linked directly by rail to Salonika, but also by road to various parts of the upper and middle Vardar valley, is destined, no less than Salonika itself, to be a bone of contention to the states interested in Macedonia.

To complete the picture of the relations of Monastir let us turn westward to the lake district. The lakes of Presba and Okhrida are all but ringed by mountains, and lie, as it were, upon the margin between Macedonia and Albania, that is upon the junction zone of coastal fold mountains and central intermediate belt. Indeed, from a strictly geographical standpoint, it may be said that they should belong to Albania, and not to Macedonia, for Lake Okhrida gives rise to the Black Drin, which, after joining with the White Drin, enters the Adriatic near S. Giovanni di Medua: and though Lake Presba has no apparent outlet it seems to drain by an underground channel to Lake Okhrida, and thus also to the Adriatic. The lakes have therefore no direct relation to the Vardar system. But though a satisfactory-looking mountain range intervenes between the basin of Monastir and Lake Presba, this sinks down at its northern end to allow an easy road to pass from the town of Monastir to that of Resnia on the plain to the north of the lake. Thereafter this road crosses a hilly region to reach the towns first of Okhrida and then of Struga, at the north end of Lake Okhrida, and no enterprising power in possession of Struga could fail to utilise the Shkumbi valley in order to construct, along the line of the ancient Roman way, a railway to the Adriatic at Durazzo (D on Fig. 1). Monastir, then, can never represent a terminus to any progressive power. It entices onwards to the lake country, and once there the tendency for any state must be to burst through the western barrier in order to reach the sea.

South of the lake country other, less important, routes lead also from the basin of Monastir to the Adriatic. It was by these routes that the Turkish army escaped into Albania after the Serbian victory at Monastir in 1912. There is also connection with the Upper Vistritza valley, containing the town and lake of Kastoria, a region with natural routes into Greece proper.

On the basis of the above description we may now summarise the chief basins and towns of the part of Macedonia just dealt with. The first basin on the Vardar is that of Tetovo, with the town of Kalkandelen, marking a junction of routes into Old Serbia, Albania, western Macedonia, and also east to Uskub. Next follows that of Uskub, whose importance as a nodal point we have already emphasised. The basin of Uskub is

practically continuous with that of the lower Pshinia, which has on its upper course, not only Egri Palanka already mentioned, but the hill centre of Karatova. On the main Vardar valley there are few fertile belts, and the towns mostly obtain such importance as they possess from the fact that they mark the junction of the lateral valleys. On the course of the Bregalnitza the basins and towns of Kochana and Ishtip are important.

On the upper course of the Tzerna, as already stated, lies the Pelagonian plain, with a total length of about 45 miles, and a mean breadth of about 12½ miles. The most important towns are Monastir, Prilep, marking the north-eastern gateway of the plain, and Krushevo, which similarly marks the north-western entrance. Nothing need be added to what has been already said as to the towns in the vicinity of the lakes.

On the plain at the mouth of the Vardar, Salonika predominates over all other towns, but Veria at the south-western margin, and Vodena at the north-western, should both be noted. Owing to the course of the railway, which has to avoid the central lakes and swamps of the plain, both are on the Monastir-Salonika route.

The only important question which remains to be considered in regard to the geography of Macedonia is the Struma valley, its basins and their towns.

The first point in regard to this river is the fact that it takes its origin far within the Rhodope upland, its headwaters having their source in the Vitosh Mountains, only some 13 miles south of Sofia. It thus forms geographically a direct route from the capital of Bulgaria to the Ægean. Further, as already mentioned, there is easy connection from its upper waters over into the middle Vardar valley. The main stream has two important tributaries, the Strumnitza on the right bank, and the Angista on the left bank, which enters a lake on the course of the main stream, shortly before this falls into the Ægean.

The Strumnitza drains a fertile basin containing a town of the same name. From this basin there is easy connection with Ishtip on the Bregalnitza, also with the Vardar valley direct, and by Doiran with the north-eastern part of the plain of Salonika.

Below the entrance of the Strumnitza the Struma flows through the wide, partly swampy, lake-containing, but also very fertile basin of Seres, famous for its tobacco fields. Here the chief towns are Seres itself and the town of Demir Hissar. The Angista similarly drains the basin of Drama, and Kavala is, or might be, the port both of the Drama basin and of the Seres basin, though the town of Seres has a direct connection with the town of Salonika by road, as well as the more roundabout one by rail *via* Doiran. A railway down the Struma valley from Sofia would put that town in direct communication with the port of Salonika, and also, if a short branch were constructed, with Kavala *via* Seres and Drama. Such a line could be constructed with no great difficulty, if political conditions permitted.

The above account may perhaps seem excessively detailed, but all the facts given are essential for a firm grasp of the Macedonian problem,

one of the most difficult of those which will require settlement after the war. The description will permit us to summarise without difficulty the chief facts in the recent political history of Macedonia.

Put in its shortest form it may be said that the description shows that Macedonia is not a unity in the sense of being a self-contained land, for it is pierced almost everywhere by routes leading to adjacent lands, of which it forms, strictly speaking, but a part. Further, its important elements, from the human point of view, may be said to be four in number: (1) The plain of Salonika, with the town of the same name, and also those of Vodena and Veria, the whole forming the heart of Macedonia; (2) the basin of Monastir, with the town of that name, the centre of West Macedonia, and also Prilep and Krushevo, together with the lake country to the west, containing Resnia, Struga, and Okhrida; (3) Uskub, with the neighbouring town and basin of Kalkandelen, the centre of North Macedonia; (4) the double basin of Seres and Drama, with the towns of the same name, and the port of Kavala, forming the most important region in East Macedonia, commanding the direct access to Sofia from the sea. The other towns and villages of Macedonia are chiefly interesting in their relation to those just mentioned, especially when they command routes leading towards them. In the settlement which followed the Second Balkan War, (2) and (3), that is the regions round Uskub and Monastir, fell to Serbia. Greece received (1) the Salonika basin and (4) the basins of Seres and Drama, while Bulgaria obtained only the Strumnitza valley, *i.e.* a very insignificant portion. The connections of the Uskub, Monastir, and Salonika regions with each other are much closer than that of any one of them with the Seres-Drama area.

We have next to consider the recent history of Macedonia, with the object of determining the actual political effect of the peculiar geographical conditions just described.

For this purpose it is not necessary to go further back than the treaty of San Stefano, signed in March 1878, which closed the Russo-Turkish War, undertaken by the former power on behalf of Bulgaria. This treaty gave Bulgaria the whole of Macedonia, with the exception of the Chalcidic peninsula and the port of Salonika, and is deeply engraved on the hearts of the Bulgarian people. But it never became operative, for it was revised in the June of the same year by the treaty of Berlin, the treaty which has been responsible for so many Balkan difficulties. By its terms Macedonia was given back to the Turks, but the famous Article 23, so often quoted, provided for the introduction of reforms in the province. Needless to say the article had no practical result, and Macedonia became a region of ceaseless unrest. To the original strife between Christian and Moslem was added the antagonism of the different forms of national propaganda, carried on by the aid of church, of school, and later by armed bands. Bulgars, Greeks, Serbs, Roumanians, all took part in the struggle, and it seems clear that the Christians showed themselves at various times as bloodthirsty as ever were the Turks.

The long period of unrest was punctuated by a series of futile

attempts on the part of the Powers to bring peace and reform. For example, a combined effort was made by Russia and Austria in 1903, and proved a failure. In 1908 also King Edward VII. and the Tsar Nicholas drew up the Reval programme, which was abandoned when the rise of the Young Turk Party aroused such high hopes in Europe. These hopes, as is well known, were doomed to speedy disappointment, and the internal difficulties of Turkey, no less than her war with Italy, awakened in the Balkan States the hope that they might themselves be able to deal with the Macedonian problem by the most obvious method, that of ousting the Turk altogether. This brings us to the year 1911, and the beginning of the events which culminated in the present world war.

The first clear sign of impending events was the establishment of the Balkan Alliance, an event which took place in 1912 (Serbo-Bulgar treaty, signed March 14, 1912, Greco-Bulgar Treaty, May 29, 1912). The full story of the negotiations which preceded the signing of these treaties is not yet known, but M. Guéchoff's book *L'Alliance Balkanique*, reviewed here on p. 665, adds from the Bulgarian side a number of details to those which had previously appeared. The main facts will be found in the political reviews of the period, especially in *Questions Diplomatiques et Coloniales*, and also in the various books on the Balkan wars, as in Mr. Crawford Price's *The Balkan Cockpit* and Mr. J. G. Schurman's *The Balkan Wars*.

We cannot attempt here to follow all the long and tortuous negotiations which resulted ultimately in the founding of the league, but M. Guéchoff, who, as Bulgarian Prime Minister at the time, took an active part in them, makes at least certain points clear. His book shows that the object of the alliance, so far as Bulgaria was concerned, was to conduct an offensive against Turkey, with the object, *inter alia*, of liberating Macedonia from Turkish rule. He strove hard to have the establishment of the autonomy of Macedonia set down as the object of the league, but it is fairly clear that the Bulgarian desire to regard the region as a unit had neither a geographical nor an administrative aim. It was evidently expected that the autonomous state, if it ever came to exist, could have but a brief existence. It was apparently anticipated, however, that once the country came to be regarded as a unit there was hope that Bulgaria might in the future become the Bulgaria of San Stefano by the absorption of the entire state. Probably also vaster schemes were foreshadowed in the minds of Bulgarian statesmen. Not unnaturally, however, Serbia and Greece manifested considerable reluctance to go to war with Turkey with the object of serving ultimately Bulgaria's ends—hence the very lengthy discussions.

If M. Guéchoff's story is to be relied upon, it would appear that he did in the end succeed in obtaining from Serbia a treaty which virtually made that country a cat's-paw, by working upon her ever-present fear of Austria, while on the other hand he burnt his fingers in dealing with the astute Greek. But, as we shall show, it remains questionable whether there was so notable a failure of Serbian diplomacy as M. Guéchoff's account suggests. What is at least certain is that there

never was a Balkan Alliance in the sense of a friendly combination of states for the equal benefit of all. The conduct both of Greece and of Bulgaria shows that each was out for what could be got, and that neither was bound by any very lofty conception of honourable conduct to an ally. Recent politics and history will be more readily understood if the much-vaunted Balkan Alliance be recognised for what in essence it was—a mutual attempt on the part of Greece and Bulgaria to get the other to pull the Macedonian chestnut out of the fire. Bulgaria had of course other ambitions in Thrace in addition, but with these we are not concerned here.

We published here on p. 296 of the previous article a map of the Secret Treaty between Bulgaria and Serbia, based upon a sketch which appeared in *Questions Diplomatiques et Coloniales* for June 1, 1913. In his book M. Guéchoff gives the full text of the treaty between the two States with its secret annex, and also a map which differs in various respects from that map. But this map, apart from the text, gives a somewhat misleading idea of the treaty. We give here a reproduction of M. Guéchoff's map (Fig. 3), which should be compared with the previous figure.

The essence of the Secret Treaty, as given by M. Guéchoff, is as follows. Macedonia and Old Serbia were divided into three belts, whose limits and attribution were as follows :—

(1) Bulgaria was to recognise the right of Serbia to the territories to the north and west of the Shar Mountains, that is to Old Serbia as usually defined.

(2) Serbia was similarly to recognise Bulgarian rights over the territories to the east of the Rhodope Mountains and the river Struma.

(3) The intervening zone, that is the region included between the Shar, the Rhodope Mountains, the Ægean and Lake Okhrida, including thus the greater part of Macedonia, was to be the object of a special and complicated arrangement as follows. In the first place the two states were to assure themselves that it was impossible that the region could be erected into an autonomous state. If this decision was made, the division was to be conducted thus. Serbia was to make no claim to the region lying beyond ("au-delà") a line drawn from the headwaters of the Pshinia river in Mount Golem to the shore of Lake Okhrida, and Bulgaria was to accept this frontier, which was very elaborately defined, if the Tsar of Russia decided upon it. But to this article was added the following paragraph: "It is understood that the two contracting parties bind themselves to accept as the final frontier the line which H.M. the Tsar of Russia, within the above-mentioned limits, regards as satisfying in the best way the rights and interests of the two parties." In addition to this a separate article bound the two parties to submit to the arbitration of the Tsar all questions arising out of the execution of the treaty.

Taking this treaty at its surface value, it would seem that at best Serbia could only hope to gain Old Serbia and the region round Uskub, the three other important belts of Macedonia as given above falling to Bulgaria's share. If the Tsar so decided Serbia was to be shut in to the

Fig. 3.—Map to illustrate the provisions of the Serbo Bulgar Secret Treaty, and the frontiers laid down in 1913. (*After Guéchoff.*)

north of Shar Mountains, the exact line here not being given in the treaty, and differing considerably in the two versions of the map published.

But, it is important to notice, according to M. Guéchoff, at so early a date as September 28, 1912, two days before the Bulgarian mobilisation, the Serbian Prime Minister, M. Pashitch, issued to Serbian representatives abroad a despatch in which the towns of Prilep and Okhrida were stated to form part of Old Serbia. Even at this very early date, therefore, there seemed a possibility that the matter was not so clear as the Bulgarians believed. The question of the ownership of Okhrida and with it of Struga is of very considerable importance to Serbia, for, as a glance at the railway map on p. 299 will show, Serbia hopes to construct a railway from Uskub *via* Dibra, Struga and Elbasan in Albania to Durazzo. According to M. Guéchoff, Serbia consented to both Struga and Okhrida being assigned to Bulgaria, which, if true, would make the construction of this line difficult.

The Greco-Bulgar treaty can be discussed much more briefly than the Serbian one, for the simple reason that "because of want of time, it was not possible to make an arrangement with Greece in regard to the delimitation of frontiers in Macedonia" ("le temps manquant, on ne put conclure un accord avec la Grèce pour la délimitation des frontières en Macédoine"—*L'Alliance Balkanique*, p. 69). On this the only commentary necessary is that the treaty, as already stated, was signed on May 29, and the declaration of war against Turkey took place on October 18. It might be supposed that a certain amount of negotiation, if both parties are willing, can be carried on in a period of four and a half months, and it is perhaps not unjust to suppose that it was want of will rather than of time which was the obstacle.

Even the very generalised treaty concluded between Greece and Bulgaria was, however, preceded by a certain amount of negotiation, and two facts emerge from M. Guéchoff's brief summary of this. First, Greece responded with a flat refusal to the proposal that she should bind herself not to oppose the erection of an autonomous Macedonia, and, second, she hinted, not obscurely, at her designs upon Salonika, a point of much interest.

The only other point which is worth comment in regard to the treaty with Greece is that M. Guéchoff signed this document, after having been informed of Greece's views in regard to Macedonian autonomy, just as he had previously signed that with Serbia, which put forward as a possibility the establishment of an autonomous state which was to include the greater part of Macedonia. There is no evidence that the Greek point of view was communicated to Serbia. It is obvious that it was scarcely possible, under any circumstances, that the Balkan Alliance, conceived under such a cloud of mutual distrust and reserve, could have survived a campaign in the field.

Perhaps it should be added that the above summary is based upon the official documents given in M. Guéchoff's book, and on statements made there and checked, so far as possible, from other sources. Mr. Schurman in his book, mentioned above, gives a somewhat different

account. In the first place he emphasises what he regards as the contrast between the *defensive* alliance concluded between Greece and Bulgaria, and the *offensive* one drawn up between Serbia and Bulgaria.

In regard to this point it is perhaps only necessary to say that the Serbo-Bulgar treaty proper was also of a defensive nature, the provisions for an offensive being contained in the Secret Annex. Further, since, in the first half of May 1912, the Bulgarian diplomat, M. Daneff, had candidly avowed to the Russian foreign minister of affairs the Bulgarian intention to make war at the first favourable opportunity ("M. Daneff n'avait pas caché à M. Sazonoff, que la Bulgarie attendait la première occasion pour jouer sa partie," Guéchoff, pp. 76 7), and this at a date prior to the signing of the agreement with Greece, it seems curious if, in the months of negotiation which preceded that treaty, Bulgaria's bellicose intentions had never leaked out. As to the fervent desire for peace expressed in the treaty—expressed, be it remembered, after M. Daneff's frank statement quoted above—it is justifiable to regard it as of the same value on the Greek side as on the Bulgarian one. Both powers were fervent advocates of peace—until they were ready for war.

Mr. Schurman's second point is even more interesting, though, at least on its face value, even less creditable to Greece. According to him, Greece, even after the signing of her treaty with Bulgaria, was secretly attempting to contract *an offensive and defensive* alliance with Turkey, "but before the plan was matured Bulgaria and Serbia had decided to declare war against Turkey" (Schurman, p. 35). He goes on to intimate that Greece's hand was thus forced, and that she was compelled to join Bulgaria and Serbia, because Turkey refused to yield what she claimed. The dates given for the different events in M. Guéchoff's book seem to dispose of the suggestion that Greece was forced to a premature decision by Bulgaria's action, and the delicate question as to which of the two was guilty of the greater treachery to the other must be left for historians and moralists.

The present point is simply to make clear that alliances in this part of the world are mere bargains, not regarded by either party as having any moral significance, and liable to be discarded at a moment's notice if another party makes a higher offer. Those politicians who have blamed this country's diplomacy in the Balkan region as a contributing cause of the recent complications there, would be wise to study the story of the Balkan Alliance, sordid though it be.

It is not necessary here to follow all the events of the First Balkan War, but two incidents in the campaign have an important bearing upon Macedonian problems. The first is the race between Bulgarians and Greeks for Salonika, and the second the disastrous attempt of the Greeks to forestall the Serbs at Monastir. The Greeks, it will be remembered, after the successful battle of Yenitza-Vardar, entered Salonika on November 8, 1912. The Bulgarians were, from all accounts, hard upon their heels, having apparently abandoned their allies, the Serbs, in order to make a forced march upon Salonika. Their troops, after negotiation with the Greeks, entered the town on November 11, and thereafter began the squalid tale of intrigue and quarrelling which

resulted finally in the Second Balkan War. The interest for us here is, however, simply that it is obvious that Greeks and Bulgars distrusted each other mutually, and each hoped to make possession of the desired town nine-tenths of the law.

Further, the Greeks tried, unsuccessfully, to play upon the Serbs with regard to Monastir the same trick which the Bulgarians had been nearly successful in playing upon them in regard to Salonika, and that at an earlier date. The Serbs advanced on Monastir from the north, making their advance, as already stated, both from Veles and from Kalkandelen. They had much fighting to do in the course of their advance, especially in the region of the Babuna Pass. The result was that they were not able to take the town of Monastir till November 18. Meanwhile a Greek army endeavoured to advance from the south, along the line of the railway. But the Turkish army at Monastir made a sortie, and succeeded in defeating the Greek forces in a series of engagements which lasted from November 2-5. If the Bulgarian move had for object the occupation of the important port of Salonika, it is difficult to see in this Greek one anything but an attempt to seize Monastir before the Serbian advance. As Greece, no less than Bulgaria, desires to advance across Albania to the Adriatic the purpose of such a move is quite apparent.

We must next consider, in a little detail, the offers and the claims of the three states during the period of negotiation which preceded the Second Bulgarian War. Serbia, as suggested in the previous article, demanded a revision of the secret treaty, on the ground that conditions had arisen not provided for in that treaty. Bulgaria demanded from her the carrying out of its stipulations, which meant for Serbia the abandonment of most of what she had fought to obtain. The insignificant nature of her possible gains, according to the strict letter of the treaty, have already been pointed out.

The case of Greece and Bulgaria is a little more complicated. Bulgaria offered a frontier which started from the mouth of the Vistritza and ran by Veria and Kastoria to Koritza, near the Albanian frontier. Such a line would have deprived Greece, not only of the port and plain of Salonika, but also of any important section of Macedonia, although she had fought a successful campaign against the Turk in the south of this region. Only Bulgarian arrogance could have supposed that such an offer would be accepted. Greece, on the other hand, demanded a frontier which quitted the Ægean to the west of Kavala, leaving that port to Bulgaria, but ran by Drama and Demir Hissar towards Monastir, including Seres in Greek territory. This, in combination with the Serbian claims, would have all but excluded Bulgaria from the important parts of Macedonia, but would have, broadly speaking, given her that Struma valley frontier contemplated in her treaty with Serbia, in the event of the erection of an autonomous Macedonian state, except for the loss of Seres—an important exception. In the end Bulgaria lost, of course, more than this, for she was deprived of Kavala in addition. But the treaty of Bucharest, like so many others, is now in the melting-pot, and the future of Kavala, as well as of Macedonia in general, is as yet hid from us.

There is, however, little likelihood that an autonomous Macedonia will again emerge into politics, and the fact that Italy and Serbia are both included among the allied Powers makes it virtually certain that the idea of an autonomous Albania is also likely to disappear. For, we have hinted again and again throughout this paper, the question of Macedonia is intimately bound up with that of Albania. Greece wanted Monastir because of her designs upon the Albanian coast. Bulgaria is now credited with the intention of abandoning—temporarily, one must suppose—her claim for an Ægean outlet for the sake of an extensive stretch of the same coastline. Italy is strenuously opposed to the idea of either Greece or Bulgaria establishing itself on the shores of the Strait of Otranto. It is clear then that however the Macedonian question is finally settled it will be in relation to the Albanian one, and Macedonia as a geographical conception is likely to disappear entirely from map and text-book.

In other words, that artificial separation of the western coastal belt from the interior of the peninsula, a separation which has had its origin in politics and not in geography, is likely to break down and the northern quadrilateral of the peninsula will take on its natural aspect of a tract with functional eastern, western, and southern seaboards. Hitherto the western seaboard has been all but excluded from any participation in the economic life of the peninsula. If this occurs, it would seem as if Bulgaria's suggestion that the line of the Struma valley might form a boundary between eastern and western powers has much to be said for it. We do not yet know what form the eastern and western states may take, for that Bulgaria, a power which has conducted three wars of aggression in the period 1912-15, can persist in its present form seems hardly conceivable; but on geographical grounds it would seem that a division which gave one power an Adriatic coast, the other a Euxine one, and divided the Ægean seaboard between the two, would be a sound one. The exclusion of Greece, so far as possible, from the northern quadrilateral seems geographically desirable. But to what extent political exigencies will override the dictates of geography only the future can show.

PROCEEDINGS OF THE ROYAL SCOTTISH GEOGRAPHICAL SOCIETY.

Meeting of Council.

A meeting of Council was held on the 2nd of November, when the undermentioned ladies and gentlemen were elected members of the Society:—

Ordinary.	*Associate.*
J. W. Williamson.	Morton C. Edley, L.C.P., F.R.G.S.
Miss R. Orrock.	Miss G. Frances Henson.
Mohamed Handi.	Miss Lily Winchester.
Major R. Horn.	Miss B. E. Cornwall, B.A. (Lond.)
G. W. Watson.	John Ross, F.E.I.S., V.D.

The Society's University Medal.

It was decided that in future the Silver Medal given by the Society for competition among the students of geography at Edinburgh University be awarded to the first in the merit list in the Geography class.

Annual Business Meeting.

The Annual Business Meeting was held on the 9th of November in the Society's Rooms, Dr. John Horne, Chairman of Council, presiding.

The Thirty-first Annual Report of the Council was read by the Secretary. The Report appears on pp. 667-672, and, on the motion of Mr. J. H. Birrell, seconded by Miss E. Christie, was adopted.

The list of office-bearers recommended by the Council for election for the current session was also submitted, and on the motion of Mr. William Lee, seconded by Mr. R. Wilkie, were duly elected.

The following are the appointments so made:—

His Grace the Duke of Buccleuch and Queensberry was re-appointed President. The Vice-Presidents were re-elected. Colonel T. Cadell, V.C., C.B., was elected a Vice-President.

The following members of Council who retired by rotation were re-elected:—W. B. Blaikie, LL.D.; D. F. Lowe, M.A., LL.D.; H. M. Cadell, B.Sc.; Sir James A. Russell, LL.D.; William B. Wilson, W.S.; James Cornwall; John Harrison; Charles E. Price, M.P.; M. Pearce Campbell; Rev. John Kelman, D.D. Also the following members of the Society were elected to fill the vacancies existing:—A. L. Cross; Professor T. J. Jehu, M.A., M.D., F.R.S.E.; Professor Richard Lodge, LL.D.; J. D. Monro; Professor J. Young Simpson, M.A., D.Sc.; E. M. Wedderburn, W.S.; David Air, J.P.; and W. O. Duncan.

Robert S. Allan, LL.D., J. C. Buist, and the Very Rev. G. Adam Smith, D.D., LL.D., were re-elected Chairmen of the Glasgow, Dundee and Aberdeen Centres respectively.

The Chairman intimated that in the special circumstances of the present session the Council had thought it advisable to have only a limited number of lectures, but it was hoped that those which had been arranged for would prove to be of exceptional interest. It was possible that Sir Ernest Shackleton would return during the session, and when he did return we should have a lecture from him according to promise.

Lectures in December.

Miss M. A. Czaplicka, author of *Aboriginal Siberia*, will deliver a lecture before the Edinburgh and Glasgow centres on the 2nd and 3rd of December respectively. The subject will be "Siberia and some Siberians." Professor James Young Simpson, M.A., D.Sc., F.R.S.E., will address the Society at Glasgow and Edinburgh on the 9th and 10th respectively, when he will describe his recent visit to Galicia. Before the Dundee and Aberdeen centres on the 14th and 15th inst. Mr. Ralph Darlington, J.P., will give a lecture on the "Historical Geography of Palestine."

GEOGRAPHICAL NOTES.

EUROPE.

Food Supplies of Britain during the First Year of the War.—In his presidential address to Section M (Agriculture), at the Manchester meeting of the British Association, Mr. R H. Rew gave some interesting facts in regard to British food supplies during the previous twelve months. He pointed out, in the first place, that with the exception of sugar, of which our chief supply used to come from Germany, we are not dependent upon enemy countries for our chief food stuffs. We received, before the war, small quantities of wheat or flour and of eggs from Germany, Hungary and Turkey, some poultry from Austria-Hungary, some fruit from Germany and Turkey, but the total amount was insignificant. The practical cessation of supplies from Russia was the most serious loss, as we obtained from that country 9 per cent. of our wheat, 9 per cent. of our butter, and 16 per cent. of our eggs. Direct Government intervention in regard to food supplies has been limited to three commodities, sugar, wheat, and meat, but owing to the work of the navy the total weight of the chief food stuffs imported into the country during the first twelve months of the war was rather larger than in the twelve months immediately preceding. The actual figures which Mr. Rew gave show some interesting points. Thus rice showed an enormous increase, nearly double the total of the preceding period being imported in the first twelve months of the war. The chief commodities which showed shortage were meat (nearly 12 per cent. less), sugar (nearly 9 per cent. less), butter (6 per cent. less). On the other hand, bacon and hams showed a great increase (25 per cent.), cheese increased by 16 per cent., fruit by 8 per cent., while wheat was only slightly diminished (by rather over 1 per cent.). In ending his address with an eloquent tribute to the work of the navy, Mr. Rew says, "the nation may rely that, while common prudence enjoins strict economy in husbanding our resources, sufficient supplies of food will be forthcoming for all the reasonable needs of the people."

Geology and the War.—At the first meeting of the session of the Geological Society of Glasgow, held on Thursday, 14th October, Professor J. W. Gregory, F.R.S., F.G.S., delivered his presidential address on "Geological Factors affecting the Strategy of the War."

In the course of this lecture he said, "The geological influences on international politics are less widely appreciated than the geographical, but the war, with its new struggles on former battlefields, is largely controlled by the geological structure of Europe. The distribution of the mineral resources of the Continent are affecting the course of the war, and may have a still more important bearing on the diplomatic negotiations at its end. The redistribution of political power in Europe during the past forty years has been greatly affected by the discovery that Germany is one of the greatest coal countries of the world. Since 1870 we have increased our coal output two and a half times and Germany

has magnified hers eightfold; even more significant is the discovery that the German coal reserves are estimated as more than twice as large as our own, and are estimated as 423,000 million tons out of the 784,000 million tons for the whole of Europe. The significance of that pregnant fact has not been generally recognised. The German coalfields are all placed in exposed positions near the frontiers, and Germany has therefore maintained an army ready for instant battle. Her military capacity has been illustrated by her seizure of the Belgian, Polish, and chief French coalfields and successful defence of all her own.

"The future of the war-wrecked Galician oil-field affects British interests in opposite ways. The Scottish oil trade would profit if the field were annexed by Russia, but the British industries which need cheap paraffin would suffer by the change. The belief that Germany could not continue the struggle if her imports of copper were stopped was one of the most widespread early illusions of the war. Germany's own copper production would doubtless suffice for her military needs. The total copper production of Germany in 1913 was 25,000 tons, but with a rise in the price of copper, the extensive areas of low grade ores at Mansfield could be profitably worked.

"The great iron-ore field of Lorraine and the recent discovery of the potash mines of Alsace both increase the difficulty of the readjustment of the Franco-German frontier. Germany now obtains three-quarters of her iron ore from Lorraine, and would strenuously resist the loss of that field. The transfer of that area would probably be detrimental to its economic interests. The re-annexation of Alsace by France offers the best prospect of breaking the German monopoly in the supply of potash. The Americans especially have endeavoured to escape from that monopoly by finding fresh sources of potash and by dodging German restrictions on the output. The German potash fields were formed by such an unusual sequence of geographical events that they are quite unique. It has been calculated that one of the German fields, even with an increased output, will last for 600,000 years. It has been suggested that at the end of the war the German potash mines might be held as security, but they are so widely spread through western Germany that their military occupation would be very expensive, and the total profit from the potash mines would be insignificant in war finance."

Travels in Albania.—In *Le Globe*, liv., there appears a report of two lectures on Albania delivered before the Society of Geography at Geneva by M. W. Briquet last spring. In the first lecture M. Briquet gives an interesting account of the country of Albania, and then goes on to discuss the inhabitants. He emphasises strongly the contrasts between the Ghegs, who live to the north of the river Shkumbi and the Tosks, found to the south of that river, suggesting that the latter are descendants of the ancient Epirotes, and the former of the Illyrians. The two peoples have little in common, and no love is lost between them; indeed the Ghegs deny that the Tosks are Albanians at all. M. Briquet suggests that this hostility was well understood by the interested powers when

they erected the independent state of Albania, and that they were animated by a hope that the two peoples would exterminate each other, and thus solve the thorny Albanian question finally! He believes that the Tosks could be readily assimilated by the Greeks, if some tolerance were exercised, and that the best fate for Albania is that the northern portion should go to Serbia, the southern in part to Greece and in part to Italy.

The second lecture contains a brief account of the history of the Albanian people, so far as this is known, and a description of the manners and customs of some of the tribes. The author gives most space to the Mirdites, a Gheg tribe living in the mountain region to the south of the Drin, and forming a compact community under a hereditary chief. The Mirdites in the strict sense form a group of only some 24,000 individuals, occupying a territory of about 370 square miles in area, but with the addition of tribes allied to them the total territory is raised to nearly 1000 square miles, and the population to 47,000. As already stated, the Mirdites group is under a hereditary chief or captain, and each of the included clans has also its hereditary chief, who conducts the men of the clan to war. The clan chief has a council of wise men to assist him, and the external affairs of the whole tribe are settled in a general assembly.

The punishment of crime is effected by fines, which are paid in cattle, but murder is excluded from crimes of which the clan or tribe can take cognisance, as vengeance in this case belongs to the injured family. Theft also is only punishable when it occurs within the tribe; the appropriation of cattle from outsiders is not a crime. Ordinary disputes are settled by arbitration, the litigants each paying their own arbitrator. If the first arbitrators cannot agree, they in their turn choose others, who may again add to their number, but these extra judges are not paid. Theft, says M. Briquet briefly, is preferred to work, for which the Albanian has little inclination. The family tie is very strong, and the "family" is large; it may include up to two hundred individuals. Marriages are arranged by the parents, and do not take place within the clan, *i.e.* exogamy is practised. In this connection it is interesting to note that an injury to a woman must be avenged by her own family, and not by her husband, though the latter can join the vendetta if he wishes. Women cannot inherit property, and a man's unmarried daughters pass into the custody of his male heir.

The customs of the other tribes are somewhat similar, the striking feature being the strength of the family tie within the tribe, and of the tribal bond. Thus among the Malissores no individual can dispose of real estate without the knowledge and consent of his whole family. Again, while the moral law is recognised within the tribe, it does not exist outside, except where brotherhood has been sworn. Thus brigandage outside the limits of the tribe is a legitimate means of increasing the tribal well-being. M. Briquet's observations thus confirm those of other travellers as to the practical impossibility of making the Albanians into one people. His own solution of the Albanian problem we have indicated above.

Ethnographical Maps of Eastern and South-Eastern Europe.—The September issue of *Petermann's Mitteilungen* contains a number of maps, of which several are ethnographical. Of these we note two of considerable interest. The one, which accompanies an article by Dr. Richard v. Pfaundler of Vienna on the Austro-Italian boundary question, shows the distribution of Germans, Italians, Slovenes, and Croats and Ladin-speaking peoples along the boundary between Austrian and Italian territory, as determined by the home tongue of the majority of the population in each case. The map also shows the existing frontier, the frontier offered by the Austrians before Italy entered the war, and that demanded by the Italians as the price of their neutrality. The map is on the scale of 1:500,000, or about 8 miles to an inch, and thus shows the country in considerable detail. The text of the article gives details of the claims of the two parties.

The other map accompanies an article by Professor Anastas Ischirkoff of Sofia on the distribution of the Bulgars in the Balkan Peninsula in the year 1912, and is noteworty because the Bulgars are shown as extending not only over southern Macedonia and much of Thrace, but also across the southern Morava, so that the towns of Vranya, Leskovatz, and Nish are shown as little Serbian islets in a population of Bulgars.

The Slavs of Austria-Hungary.—In *La Géographie* for April last there appears an article with this title by Professor Louis Leger containing many interesting facts. The author in the first place emphasises, with some amusing illustrations, the profound ignorance which till recently has prevailed in regard to the Slav peoples of the Austro-Hungarian monarchy, alike among diplomats and the educated public. The difficulty of obtaining information in regard to these peoples is accentuated by the fact that Austrian official publications are quite unreliable in so far as statistics go, and that the Austrian Slavs have no official representatives in the west, so that direct contact with their point of view is impossible. The Czechs of Bohemia have got over this difficulty in France in a somewhat ingenious fashion by the foundation of gymnastic societies, or *sokols*, which have familiarised the French people with the fact of their existence. One result has been that the Czechs resident in France have succeeded in obtaining exemption from the order of expulsion formulated against German and Austrian subjects at the outbreak of the war. Some are stated to be fighting under the French or Russian flags. Professor Leger considers that there are some ten millions of Czechs and two millions of the allied Slovaks, and hopes to see them form together a reconstituted kingdom of Bohemia after the war.

One great difficulty in regard to such a proposal is that the Slavs of Bohemia are separated by a wide stretch of land, inhabited by Germans, from their brethren the Southern Slavs. In this connection it is interesting to note on Sir Arthur Evans's map of the Balkan area, which was mentioned in our last issue (p. 573), the device by which the Balkan Committee proposes to get over this difficulty. In regard to the Southern Slavs, M. Leger seems to favour a mighty union of Slovenes,

Croats, and Serbs to form a state, for which he suggests the name of Illyria. He admits, however, the religious difficulty, pointing out in an interesting phrase that this acts as a barrier between Serbs and Croats, precisely in the same fashion as it does between Poles and Russians. The fact that the Croats use the Latin alphabet and the Serbs the Cyrillic, which is nearly the same as the Russian, is another difficulty.

The third great group of Austrian Slavs is formed by the Poles, who, as is well known, have been better treated by the Austrians than by the Germans, or, hitherto, by the Russians. In Galicia the Polish question is complicated by the fact that the eastern portion is inhabited by a people whom the Poles call Ruthenes, but who, according to Professor Leger, are merely Little Russians: like other Russians they belong to the Orthodox Church, while the Poles are Catholic. The Galician Poles, who were satisfied with Austrian rule, have made attempts to assimilate the Ruthenes, fearing that they might be attracted towards Russia.

These brief notes may help to show the complexity of the Slav question. Professor Leger's solution is that, as already stated, the kingdom of Bohemia should be reconstituted, with the addition of the Slovaks, and that this kingdom should be joined with Russia and Poland on the one hand, and with the Southern Slavs on the other, to form a Slav Federation which would keep in check the Germans and the Magyars.

Agricultural Statistics for Scotland, 1914.—The recently issued blue-book on this subject is of special interest, for from the agricultural standpoint 1914 reckons as a pre-war year, and there is reason to expect that the statistics for the current year will show some striking differences. In 1914 the tendency, noticeable in previous years, for both the area under corn crops and that in cultivation to diminish steadily was again well marked. In 1914 the area under cereals was the smallest on record, showing a decrease of 16,738 acres as compared with the previous year, and of 32,358 acres when compared with the average of the three preceding years. Oats, as in 1913, lost most ground, and the increase in the wheat area more than counterbalanced the loss of area by barley. Oats remain, however, the predominating cereal crop, occupying nearly 920,000 acres as compared with 60,500 under wheat, and 194,000 acres under barley. In 1914 the total area which went out of cultivation in Scotland was 11,740 acres as compared with 23,400 acres in 1913. In the three years, 1912-1914 inclusive, nearly 60,000 acres, previously producing crops and grass, went out of cultivation, an area equal to the entire county of Kinross. In the last twenty-five years no less than 377,000 acres in Scotland have been withdrawn from the plough. The evidence available at present goes to show that the area under cereals increased greatly in 1915.

Geology of the Glasgow District.—In part iii. of the *Proceedings* of the Geologists' Association there appears an article with this title, illustrated by a plate and a folding sketch-map, and containing contributions from a number of local geologists, the article having been

written, apparently, as a guide for the Association's visit to the region last Easter. Most of the sections of the article are very technical in nature, and thus not suited to the purposes of an abstract here, but as a whole it indicates clearly the chief geological features of the district round Glasgow, a region in which a considerable number of varieties of rocks and of land forms occurs, and is thus worthy of note. The discussions of the glacial features and their origin will appeal especially to geographers.

Asia.

Oceanographical Survey in the Philippines Area.—According to a note in *Science* the steamer *Pathfinder* of the Coast and Geodetic Survey has recently made some remarkable soundings in the south-west part of the Philippines area. From these soundings it would appear that the Cagayanes, Cavilli, and Arena islands, Tubbataha and Maeander reefs, in the Sulu Sea, are coral-capped summits of a submerged mountain range extending for 200 miles south-westerly from the south-west part of Panay Island. They rise from depths of 6000 to 12,000 feet, with a stupendous submarine slope. The soundings indicate that this range divides the Sulu Sea into two deep basins by joining the shelf or plateau extending north-west of Borneo and east of Balabac Strait. Bancoran Island and Moyune Reef are elevations at the south end of the north-west basin. The Tubbataha Keys and Maeander Reef are the only elevations without vegetation. They are steep faced, similar in structure, and consist of an accumulation of dead corals, coral rock, and coral sand cemented into a greater or less degree of compactness. The pounding of the sea has accumulated the coral sand in the centre to an elevation of five or six feet.

America.

The Glacier National Park, Montana.—We noted here on p. 98 the appearance of a pamphlet on the scenery of the Glacier National Park, Montana. We have since received Bulletin 600 of the U.S. Geological Survey, which under the title of *The Glacier National Park: A Popular Guide to its Geology and Scenery*, gives a very full account of the park and its means of access, illustrated by a fine topographic map, and some excellent illustrations. We recommend the pamphlet to the notice of those interested in the scenery and geology of the Rocky Mountains.

Flora and Fauna of the Panama Canal Zone.—Mr. George Shiras contributes to the August issue of the *National Geographic Magazine* an account of an expedition which he undertook to the Panama Canal zone, both for the purpose of collecting natural history specimens, and to study the changes in the fauna and flora of the region due to the formation of the huge Gatun lake. Of these changes he gives an interesting account, illustrated by some fine flashlight photographs of various characteristic animals. From the geographical standpoint,

however, the most important part of the article is that which deals with the Gatun lake in its relation to the canal zone. Two sketch-maps are given, one showing the conditions before and the other after the construction of the canal. From the latter it appears that more than one-third of the lake is outside the canal zone, as well as practically all its feeders. This fact, in the author's opinion, interferes seriously with the United States control of the canal and lake from the commercial, engineering, sanitary and military standpoints. He gives various illustrations of the risks which are being run at present, notably of the contamination of the lake water by the uncontrolled development of settlements on the banks of the lake outside the zone, and of the reappearance of malaria. He and his two companions all developed malaria, and he points out that all the elaborate precautions taken by the canal authorities may be nullified by carelessness in the regions not under their control, while at the same time the presence of the lake and of the railway permit of a freedom of communication unknown before. He suggests the purchase from the republic of Panama of an additional area large enough to protect the canal completely, and that then the lake area might be made the centre of a great international park which would become the home of the interesting animals of the region.

Australasia.

Pleistocene Man in Australia.—At a formal meeting held in June last in the University of Sydney the Talgai skull was presented to the University by the Hon. Joynton Smith. This skull, which is completely mineralised and was found in the neighbourhood of Talgai, in the Darling Downs, Queensland, was demonstrated by Professors Edgeworth David and Wilson to Section H of the British Association last year in Sydney. At the outbreak of war Professor Wilson had to devote himself to his military duties, and handed over the skull for investigation and description to Dr. Arthur Smith, acting professor, who, with the assistance of Mr. D. M. S. Watson, has succeeded in freeing the skull from the matrix, and exposing fully its extraordinary features. At the meeting named above both Professor David and Dr. Arthur Smith delivered addresses on the skull. Professor David stated that the skull, which is of Pleistocene age, shows certain very primitive features, and may be that of a member of the first human family to cross Wallace's line, and introduce the dingo into the Australian continent. Thus, according to Professor David, the discovery of the skull may serve to explain how it is that Australia, with its marsupial fauna, had an invader in the form of the dingo, a sort of Asiatic jackal, which "had no more right here than the Germans in Belgium."

The above notes are taken from a short article on the subject which appears in *Nature* for September 9.

General.

Ice and the Ice Age.—Dr. J. D. Falconer, lecturer in geography in the University of Glasgow, is at present delivering a series of lectures

on this subject in connection with the British Museum (Natural History), the course constituting the Swiney lectures on geology. The subjects of the lectures are as follows:—Introductory, Snowfields and Mountain Glaciers, Arctic Ice, Antarctic Ice, The Discovery of the Ice Age, The Accumulations of the Ice Age, The Ice Age in Europe, The Ice Age in North America, The Continuity of the Ice Age, Man and the Ice Age.

The Scientific Work of the late Professor James Geikie.—At the first ordinary meeting of the Royal Society of Edinburgh for the present session, held on November 1, Dr. John Horne, F.R.S., President of the Society, delivered an address on "The Influence of James Geikie's Researches on the Development of Glacial Geology." Dr. Horne said that the subject of the address was chosen because James Geikie's researches in glacial geology were the most striking feature of his scientific career. They stimulated inquiry, and at the same time they aroused keen opposition. Brief allusion was made to the state of research in this country when he began his investigations, how glacial phenomena were erroneously attributed to the action of icebergs, and how the clue to the correct interpretation was furnished by Agassiz during his visit to Scotland in 1840. From the evidence which Agassiz obtained in the Midland valley and in the Highlands, he inferred that glaciers formerly existed there in post-Tertiary time.

The land ice theory of Agassiz was adopted and confirmed by Buckland, Jamieson, Ramsay, and Archibald Geikie, but nearly a quarter of a century elapsed before the accuracy of this interpretation was adequately recognised. As James Geikie's field work in the Geological Survey proceeded he evolved certain ideas regarding changes of climate in Pleistocene time, based on the succession of boulder clays with intercalations of sand, gravel, and peat, and on the cave deposits and Palæolithic gravels in the South of England, which he subsequently published in his volume, *The Great Ice Age*, appearing in 1874. He therein gave a detailed account of the glacial and post-glacial deposits in the United Kingdom, Scandinavia, Switzerland, and North America. Through the whole description runs the principle which James Geikie believed to be fundamental, that the glacial epoch was not one continuous age of ice, but consisted of a series of cold and genial periods. He next proceeded to discuss the age of the Palæolithic gravels and cave deposits in the South of England. He opposed the view held by many that they were post-glacial, and referred them to inter-glacial or pre-glacial time. As regards the commingling of northern and southern mammals in these deposits, he combated the theory of Boyd Dawkins that this assemblage was due to seasonal migrations. He believed that the phenomena pointed to changes of climate.

These were the essential points in James Geikie's teaching which he never discarded. They encountered persistent opposition from the mono-glacialists, who contend for the unity of the glacial epoch, and ascribe the intercalated deposits to local movements of recession of the ice within one period of glaciation. Attention was next directed to Geikie's elaborate classification at the close of his career of six glacial epochs separated by

five genial periods, to the classification established by Penck and Brückner in the Alps, and to that of Professor Chamberlin for North America. In conclusion, the opinion was expressed that sufficient evidence had been obtained to establish the general principle of changes of climate in the glacial epoch, though the number of inter-glacial periods may remain a subject of controversy.

Commercial Geography.

The Potassium Deposits of Alsace.—In France no less than elsewhere the cutting off of the supplies of potash from the Stassfurt mines is arousing interest in the question of other sources of potash, both during and after the war. In an article in the *Revue Générale des Sciences* M. Henri Blin both discusses generally modes of obtaining potash-containing fertilisers, and also of utilising the unexhausted potash of the soil, and also describes in some detail the deposits of potassium salts in Alsace, which have been treated in somewhat sensational terms in the daily press recently. The deposits were discovered in 1904, and cover an area of some 50,000 acres. They are bounded to the east by Mulhouse, to the north by Radersheim, to the south by Keiningen and to the west by Cernay, and are worked at Wittelsheim, to the north of Mulhouse. Should Alsace again become French they will form an inexhaustible source of chemical fertilisers for French agriculture. The beds are estimated to contain some 300 million tons of pure potash, which at present rates of consumption would supply the world demand for potash for nearly five centuries. The most important constituent of the Alsatian deposits is sylvinite (a mineral in which the chloride of potassium predominates), which can be used directly as a fertiliser after pulverisation.

EDUCATIONAL.

New Geography Room at Royal High School, Edinburgh.—On Tuesday afternoon, November 16, Mr. George G. Chisholm opened formally the New Geography Room at the Edinburgh High School. This room is fitted up to enable the study of geography to be carried on under the most modern conditions, and contains an excellent lantern with large numbers of slides to illustrate the various aspects of the subject; particularly good maps, including those of the Balkan Peninsula, Central Europe, Russia, etc.; relief maps of Scotland, and of the county of Fife, weather charts, a barograph, and the beginnings of a museum to be accumulated by the boys themselves. The opening ceremony was held in the library of the school, and was largely attended. In his address Mr. Chisholm dealt with the study of geography, and said that when he was at the High School he learned practically no geography, the only book at their disposal being Pillans's Classical Geography, so far as he remembered an agreeable and chatty book. When he told them that the only reference to the island of Crete was Ovid's description of it as "the cradle of Jupiter," they would understand what

Professor Pillans considered to be geography. There was now a distinct conception of geography, and its claims were very high indeed. It was a subject that could be made to depend to a great extent on a child's own observations, and was particularly valuable on that account. In the description of the Arctic or the Tropic regions, which interested the child because they were unfamiliar, these regions should be connected with his own country. The influence of hills, of rivers, and of roads could easily be brought home to the children from their own observation, and they should be brought to understand how the facts concerning places influenced human life. Geography was essentially a focussing study, drawing on the studies of languages, physics, chemistry, botany, and history. Particularly interesting was the connection between history and geography, and the child could not fail to be interested in the effect on its history of the geographical situation of such a city as Constantinople. In addition to these advantages, there was also the practical value of geography. He thought that Mr. Strong and Mr. Muir had done well in urging on the School Board the institution of that laboratory, and the Board had done well in providing it.

Subsequently the audience had an opportunity of inspecting the new room as well as other parts of the building, and Mr. Muir showed a series of lantern slides, the lantern being ingeniously arranged, with the help of a mirror, so that it could be worked by the teacher from the platform, and the various points upon the slides demonstrated without the necessity for the teacher turning his back to the audience during the process.

NEW BOOKS.

EUROPE.

Geographical Aspects of Balkan Problems in their Relation to the Great European War. By Marion I. Newbigin, D.Sc. London: Constable and Co., Ltd., 1915. *Price 7s. 6d. net.*

In view of the complexity of its structural, hydrographical, racial, and social conditions, it requires no small courage to attack on modern lines the geography of the Balkan Peninsula. The forbidding nature of the task, however, makes Dr. Newbigin's success all the more striking, and her book will be welcomed as one of the most interesting and suggestive contributions to the literature of the war. Her inclusion of the results of much recent and somewhat inaccessible research and her well-reasoned presentation of the whole subject, combine also to give her book more permanent value as a reliable and up-to-date study of a notoriously difficult region.

In her treatment of existing social and political conditions, Dr. Newbigin steers her way with uniform success through a multitude of biassed observations and uncertain deductions and presents the reader with a clear and concise account of the influence of many geographical factors. Her conclusions are likely to prove generally acceptable, and it is only in the matter of speculation as to the future that there is room for difference of opinion. She demonstrates clearly from geographical principles the inherent impossibility of the settlement of frontier problems which was imposed by the Powers upon the Balkan States in 1913, and

directs attention to the possibility of finding a satisfactory solution of many difficulties with the minimum of political upheaval by assigning the Struma Valley to Bulgaria and allowing Serbia an outlet to the Adriatic by way of the Albanian Gap. With the Greeks in Salonika, however, such a solution would imply the permanent partition of Macedonia and of the Vardar Valley, and from the point of view of political stability would appear to traverse the well-established geographical principle, that a coastal state holding the mouth of an important river valley or the terminus of an important line of inland communication occupies a precarious political position and exists only on the sufferance of the interior powers. A virile and progressive Serbia would be unlikely long to remain satisfied with only one indifferent outlet, and that to the Adriatic above Otranto. These are matters, however, which, as Dr. Newbigin remarks, are unfortunately more likely to be solved according to the balance of power after the European War than according to the principles of modern geography.

The Russian Year-Book for 1915. Compiled and edited by N. Peacock. London: Eyre and Spottiswoode. *Price* 10*s.* 6*d. net.*

Those who have interested themselves in Russian affairs during recent years will learn with regret that Dr. H. P. Kennard, the founder and editor of this year-book, died in May last. His former assistant, Miss Netta Peacock, has now undertaken the sole editorship.

We learn from the preface that a volume of the year-book on similar lines to its predecessors was prepared last year, for publication at the beginning of 1915. But as the period of publication approached, it became obvious that much of the material was useless under the altered conditions brought about by the war. The book was therefore held up until the issue of the new Temporary Customs Tariff afforded a justification for its appearance in a modified form. Much of the matter which has appeared in the previous four issues has disappeared: and in its place there is an account of the state of Russia during the first six months of the war, a lengthy discussion of the directions to which British commercial enterprise may be turned, as well as a diary of the war to the end of June 1915, and sections devoted to other subjects of current interest. In connection with possible future developments of trade between Russia and the United Kingdom, it is noted that whereas the metric system is familiar to the Russians, the complicated British weights and measures are hardly known at all. Very interesting are the notes on the effects on Russian economic life of the virtual cutting off of the external market. The blocking of exits from the Baltic and the Black Sea has necessarily increased the importance of Arkangel and Vladivostok. The latter is said now to be important as a means of commercial communication even with Southern and Western Europe. In the factories the effect of increased sobriety is stated to be such an increase of efficiency as to compensate to a considerable degree for the drain of operatives called to the army. For many other interesting points bearing on war problems we must refer our readers to the book itself.

Denmark and the Danes. By W. J. Harvey and C. Reppien. London: T. Fisher Unwin, 1915. *Price* 12*s.* 6*d. net.*

Written by an Englishman and a Dane, this valuable work describes how "Denmark, during the last half century, has passed through the throes of a wonderful regeneration. Her peasantry have been emancipated from a condition

of veritable serfdom; her education has been liberalised; her Land System, Agriculture, and Finance have been reorganised and brought to a pitch of excellence." We are told that the Danes possess "an immense capacity for hard work and sustained effort; extreme democratic principles; a strange fatalism which is a mixture of scepticism and hesitation; and finally a complete and wonderful fearlessness in throwing over traditions and prejudices." We are glad to learn that "at the present moment English manners, customs, and ideas are in great demand in the Danish metropolis. An Englishman finds a readier welcome than any other national. The Germans, largely owing to the Sleswick-Holstein trouble, are, as elsewhere on the Continent, not held in any great esteem. English is very generally spoken in the homes, the shops, the clubs, and in business, social, political, and literary circles. Several of the most important booksellers in the Danish capital rely for a large proportion of their profits upon the sale of the best works in modern English literature." One of these (not mentioned by the authors), showing the greatest sympathy with the Danes, is Mr. Edmund Gosse's charming *Two Visits to Denmark*, published in 1911.

The new system of land tenure in Denmark, and its results, will probably attract most attention abroad. The authors consider that the reason why the Danish farmer now takes a superlatively high position is due to "(1) a favourable system of land tenure, 2) advanced and well-developed methods of co-operation, and 3) a close alliance between the theoretical scientist and the practical farmer, the laboratory and Mother Earth." The climate of Denmark is much the same as that of Ireland, and the land possesses little fruitfulness. By converting large into small holdings by co-operation, and by a scientific system of agriculture, the Danes have been enabled to overcome the disadvantages of their meagre inheritance and to wring an extraordinarily large return from their soil. "Denmark is to-day largely a country of small peasant proprietors. In the last fifty years some 10,000 farms have become the absolute property of their holders, and at the present time only 27 per cent. of the area of Denmark is burdened with rent." However, the authors add that "the key to the success of Danish farming, indeed the key to the success of all Danish enterprises, may be found ultimately in the question of Education." They inform us that "the headquarters of scientific farming in Denmark are at the Copenhagen High School of Agriculture. This institution was founded in 1858, has a staff of forty professors, and controls experimental stations in various parts of the country. All the year round lectures are given, reports received, experiments made, and assistance afforded to young farmers who are qualifying to take up holdings in the country." The authors proudly add "To-day a Danish farm is a scientific machine as nearly perfect as it is humanly possible to be, a machine in which the possibility of error is all but eliminated." No Scottish agriculturalist should fail to read this inspiring record of Danish success, which corroborates the report of the Scottish Commission on Agriculture to Denmark in 1904.

Chapters on Danish culture, finance, industry, and government conclude this very instructive volume. The authors declare that the man who more than all others created the new era of Danish literature is Georg Brandes. They select three names as representative of the most important scientific work recently accomplished in Denmark, viz. N. R. Finsen, who discovered the utility of the violet rays for killing the malignant bacteria of *lupus*, and who received in 1903 the Nobel prize for medicine; Valdemar Poulsen, the inventor of the arc and continuous-wave system of radio-telegraphy; and Ivar Knudsen, whose firm bought the Diesel patents in 1897, and were the builders of the first motor-driven liner, the *Selandia*, for the East Asiatic Co. of Copenhagen in 1911.

Germany at a Glance: Aid to Map Reading. London: William Clowes and Son, 1915. *Price* 1*s.* 6*d. net.*

The title of this booklet seems to have been altered at a late stage of preparation, for while the cover bears that given above, the title-page reads, "Everybody's Aid to the Map Reading of Central Europe, compiled with special regard to Germany." But the page headings follow the outer cover, and it is with something of a shock that one finds under the heading "Germany at a Glance" the words "Towns on the Rhone—Sitten, Genf, Lyons, Avingnon" (*sic*), while under the same heading Belgrade and Silistria are given as towns on the Danube. The reader is at first apt to wonder whether he has been sleeping, and Germany has annexed unawares the greater part of Europe. We cannot but regard the fact that, throughout the greater part of the book, there is no indication of the country within which the towns, rivers, mountains, etc., mentioned lie as a defect. Further there are many minor inconsistencies both as regards what is included and what is omitted. Thus the Canal du Midi is mentioned but the river Garonne finds no place under rivers. The Aar, Reuss and Limmat are honoured with the largest capitals used, though it is difficult to see what the importance of the last can be to those for whom the book is intended, and the very important Meuse and Moselle are in small type. The Burgundy Canal occurs in a German form, and the fact that the Kaiser Wilhelm Kanal is more familiar to us as the Kiel Canal is not mentioned. The Aisne also finds no place among the feeders of the Seine, though one would suppose it to be of more strategic importance than the Limmat. It is perhaps unreasonable to complain of the frequent misspelling of place names, for the proof reading must have been heavy, but the index might have been improved. The pamphlet will doubtless prove of use to those who wish to get up rapidly from maps the chief geographical names used in the region treated.

Belgium and Germany: Texts and Documents. Preceded by a Foreword. By Henri Davignon. London: Thomas Nelson and Sons. *Price* 6*d.*

We cannot review here this terrible indictment of the actions of German troops in Belgium in August 1914, which is accompanied by photographic reproductions of documents and by numerous other photographs. It may be sufficient to say that if there are any who feel their resolution slacken they will find here material to stiffen it anew. Amid the pages of sickening horrors, we find one devoted without comment to extracts from the famous manifesto by ninety-three German savants, artists and professors. One of these extracts contains the statement, made with that strange fatuity which has appeared so often in German war documents, that "our war staff . . . knows nothing of undisciplined cruelty," and the text supplies a commentary by showing how discipline can be employed to root out all traces of humanity in a docile race.

L'Alliance Balkanique. Par Iv.-E. Guéchoff. Paris: Hachette et Cie, 1915. *Price* 3 *fr.* 50.

This book, published before the entrance of Bulgaria into the great war, is of much topical interest, though this interest is largely political, and not geographical. M. Guéchoff was Bulgarian Prime Minister during the fateful period 1912-13, had much to do with the founding of the Balkan Alliance, and resigned on May 17/30, 1913, one month before the outbreak of the Second Balkan War. The object of his book is given in the preface as the presentation, from the Bulgarian standpoint, of the events which led up to the formation of the Alliance, and of those which brought about its rupture, in order to show that the Bulgarian people had little or no

responsibility in bringing about that rupture. The book is thus written definitely from a party standpoint, and is incomplete as a full history of events. Further, it is arranged in a somewhat confused fashion, perhaps designedly so, and must be taken only for what it is, the *apologia* of M. Guéchoff and his party. But it is full of interest for the political historian, and the geographer who would form just views on the Balkan tangle cannot afford to neglect it. As of special interest we may note the map showing the Bulgarian view of the territorial settlement contained in the secret treaty (cf. p. 647), and also the text of that treaty, which is given in full in an appendix. It is not without pathetic interest to note that the treaty was to run till 1920, and that Bulgaria definitely engaged to assist Serbia in the event of Austria-Hungary making an attack upon her. Conditions indeed change rapidly in this far-off corner of Europe!

BOOKS RECEIVED.

With the Russian Army: Being the Experiences of a National Guardsman. By Robert R. M'Cormack. With Maps, Charts, and 24 full page Illustrations. Crown 8vo. Pp. xiv + 306. *Price* 6*s. net.* London: Macmillan and Co., Ltd., 1915.

A History of Babylon, from the Foundation of the Monarchy to the Persian Conquest. By Leonard W. King, Litt.D., F.S.A. With Maps, Plans, and Illustrations. Medium 8vo. Pp. xxiii + 340. *Price* 18*s. net.* London: Chatto and Windus, 1915.

Studies on the Material Culture of the Eskimo in West Greenland. By Morten P. Porsild. Imperial 8vo. Pp. 135. Copenhagen: Bianco Lunos Bogtrykkeri, 1915.

Russia of To-Day. By John Foster Fraser. With 44 Plates from Photographs. Crown 8vo. Pp. viii + 296. *Price* 6*s.* London: Cassell and Co., Ltd., 1915.

Java, Past and Present: A Description of the most Beautiful Country in the World. Its Ancient History, People, Antiquities, and Products. By Donald Maclaine Campbell, late British Consul of the Island. With a Map and many Illustrations. In 2 Vols. Medium 8vo. Pp. Vol. I. xx + 656; Vol. II. x + 579. *Price* 2 *vols.* 36*s. net.* London: William Heinemann, 1915.

The Civilisation of the Ancient Egyptians. By A. Bothwell Gosse. Small Royal. Pp. viii + 164. *Price* 5*s. net.* Edinburgh: T. C. and E. C. Jack, 1915.

North America during the Eighteenth Century: a Geographical History. By T. Crockett, M.A. Edin., and B. C. Wallis, B.Sc. (Econ.) Lond. Demy 8vo. Pp. viii + 116. *Price* 3*s. net.* Cambridge: University Press, 1915.

Between Two Lines. By Boyd Cable. Crown 8vo. Pp. x + 272. *Price* 5*s. net.* London: Smith, Elder and Co., 1915.

Day by Day with the Russian. By Bernard Pares. With Maps. Demy 8vo. Pp. xii + 287. *Price* 7*s.* 6*d. net.* London: Constable and Co., Ltd., 1915.

A Hilltop on the Marne. By Mildred Aldrich. Crown 8vo. Pp. 159. *Price* 4*s.* 6*d. net.* London: Constable and Co., Ltd., 1915.

Sport, Travel and Adventure. Edited by H. G. Lewis. With 58 Illustrations. Demy 8vo. Pp. 352. *Price* 10*s.* 6*d. net.* London: T. Fisher Unwin, 1915.

Cities in Evolution: an Introduction to the Town Planning Movement and the Study of Civics. By Patrick Geddes. With 59 Illustrations. Demy 8vo. Pp. xv + 409. *Price* 7*s.* 6*d. net.* London: Williams and Norgate, 1915.

Switzerland in Winter (Discursive Information for Visitors). By Will. and Carine Cadby. Illustrated. Crown 8vo. Pp. xii + 232. *Price 5s. net.* London: Mills and Boon, 1915.

Map Reading, a Self-Instructional Manual. By Captain L. Norcock, R.M.L.I., and Captain F. S. Wilson, R.M.L.I. Fcap. 4to. Pp. 112. London: Sifton, Praed and Co., Ltd., 1915.

Some Frontiers of To-Morrow: an Aspiration for Europe. By L. W. Lyde, M.A., F.R.G.S. Crown 8vo. Pp. viii + 120. *Price 2s. 6d. net.* London: A. and C. Black, Ltd., 1915.

An Elementary Geography of Scotland (The Oxford Geographies). By Marion I. Newbigin, D.Sc. Lond. Crown 8vo. Pp. 135. Oxford: Clarendon Press, 1913. *Presented by the Author.*

Diplomatic and Consular Reports.—Trade of Kuikiang (5471); Muscat (5473); Khorasan (5481); Kerman (5482); Piræus (5483); St. Thomas and St. Croix (5485); Island of Madeira (5486); Formosa (5487); Goa (5488); Changsha (5489); Amoy (5490); Italy (5491); Azores (5492); Corfu (5495); San Thomé and Principe (5496); Southern Angola (5497); Wuhu (5498); Corea (5500); Iquitos (5501); Alexandria (5502); Japan (5503); Chicago (5504); Pondicherry (5505); Kuingchow (5509).

Annual Statement of the Trade of the United Kingdom with Foreign Countries and British Possessions, 1914. Volume II. London, 1915.

Railways in India, Administration Report for the Year 1914-15. Volumes I. and II. Simla, 1915.

Publishers forwarding books for review will greatly oblige by marking the price *in clear figures, especially in the case of foreign books..*

ROYAL SCOTTISH GEOGRAPHICAL SOCIETY.

REPORT OF COUNCIL.

Thirty-First Session, 1914-1915.

(1*st October* 1914 *to* 30*th September* 1915.)

The Council have the honour to submit the following Report:—

Ordinary Membership.

The changes which occurred during the Session in the number of members were as follows:—

Number on 1st October 1914,		1805
New Members added,		37
		1842
Deduct by Death,	42	
„ Resignation,	134	
„ Arrears,	4	
	180	
Number of ordinary members remaining on roll on 30th September 1915,		1662

Of this number, 852 are on the Edinburgh list, 417 on the Glasgow list, 157 and 110 on the Dundee and Aberdeen lists respectively. In addition to those on the lists named, 39 members reside abroad, and 87 reside in England. The number of life members in the total given above is 207.

Teacher Associate Members.

Number on 1st October 1914,		213
New Members added,		18
		231
Deduct by Death,	—	
„ Resignation,	48	
„ Arrears,	6	
		54
Number of Teacher Associates remaining on roll on 30th September 1915,		177

The number of Associate Members at the various centres are as follows :— Edinburgh, 68 ; Glasgow, 68 ; Dundee, 6 ; Aberdeen, 24. In addition 9 reside in England and 2 abroad.

Diplomas of Fellowship.

There are at present five Honorary Members, forty-four Honorary Fellows, and ninety-one Ordinary Fellows of the Society.

Diplomas of Fellowship have been granted during the session to the following ordinary members of the Society :—A. A. G. Dobson, New South Wales ; Alexander Cameron, Grantown-on-Spey.

Corresponding Members.

The honorary corresponding members of the Society now number forty-three.

Meetings of the Society.

The Society's Anniversary Meeting was addressed by Dr. Charles Sarolea. Twenty-nine ordinary meetings were held, seven in Edinburgh, eight in Glasgow, seven in Dundee and Aberdeen. These meetings were addressed by Mr. D. H. Low, Mr. Geo. G. Chisholm, M.A., B.Sc.; Mr. Stephen Graham ; Mr. Harold Raeburn, F.R.G.S.; Dr. R. W. Seton Watson ; Mr. Thomas Wilson ; and Prof. Hudson Beare.

Society's Medals.

The Silver Medal offered in connection with the Lectureship in Geography at Edinburgh University was awarded to Mr. James Walker, M.A., for his essay on the geography of Stirlingshire.

The Late Earl of Stair.

The Council have to express their deep regret at the loss which the Society has sustained through the death of its President, the late Earl of Stair, who was first elected to that office in 1910 in succession to Professor Geikie, and was re-elected at all the subsequent annual meetings of the Society. With reference to the late Earl the Council unanimously adopted the language of the Hon. Lord Guthrie in the obituary notice which he contributed to the Society's *Magazine* (pp. 37-8).

The Late Professor Geikie.

The Council have likewise to express their profound regret at the loss which the Society has sustained through the death of Professor Geikie. The Council have recorded their appreciation of the services rendered by him to the Society in the minute which appears on page 201.

The Late Mr. W. C. Smith, K.C.

The Council have recorded in the minute printed on page 302 their appreciation of the services rendered by the late Mr. W. C. Smith to the Society.

The Presidency of the Society.

The Council have to report with great satisfaction that His Grace the Duke of Buccleuch and Queensberry consented to accept nomination for the office vacated by the death of the Earl of Stair, and that at a meeting of the Society held on the 27th January 1915 His Grace was unanimously elected.

Co-operation of the Society in the Training of Officers in His Majesty's Service.

After correspondence with the headquarters of the Scottish Command and the War Office instructor appointed for Edinburgh, a meeting was held in the Society's rooms to consider how this Society could best render assistance in the training of officers. This meeting was attended among others by Major Warden of the 16th Battalion Royal Scots, Captain H. M. Johnstone, R.E., Lecturer on Military Matters in the University of Edinburgh, and Mr. Mathieson, of the Ordnance Survey Office, a member of this Council. At this meeting Captain Johnstone kindly undertook to deliver a course of lectures to the officers in training in and near Edinburgh. That course was delivered in his classroom at the University, and was largely attended. Further, Mr. Mathieson took out parties of officers for field work on several Saturday afternoons. Admission to the Society's rooms was granted to all officers in the hours during which the rooms are open, and many officers took advantage of this privilege. Among the material which these officers had the opportunity of studying were several maps kindly sent by Colonel Close, R.E., C.M.G., Director-General of the Ordnance Survey, with a view to furthering the efforts of the Society, and some of these maps were also lent to Captain Johnstone for use in illustration of his lectures.

Gifts.

The Council desire to record their thanks for the following gifts:—

Old and valuable atlases. Presented by Mr. W. Walker, 7 Blackford Road, Edinburgh.

Books and atlases. Presented by Mr. A. A. Gardner, 22 Clarence Street, Edinburgh.

A large collection of old maps, charts and atlases. Presented by Mr. Wm. H. Kettle, Bexley Heath, Kent.

Relief Model Maps of the Monmouth and Barmouth Districts. Presented by Professor H. J. Fleure, University College, Aberystwyth.

Association of Scottish Teachers of Geography.

Owing to the war the ordinary activities of this Association have been somewhat restricted during the past year. Two members of the Committee, Mr. Macgregor and Mr. Matheson, are serving with His Majesty's Forces. At the Annual General Meeting, held on November 20th, 1914, Mr. T. S. Muir read a paper on "Some Geographical Aspects of the Alps," and on January the 15th,

1915, Miss Mabel M. Barker gave an address on "The Geography of North-East France." In addition, the Association has co-operated with the Historical Association of Scotland in providing lectures dealing with the war. Mr. T. S. Muir has delivered a lecture entitled "Geography and the War," in Edinburgh, Newtonmore, Shotts, Gargunnock, and Musselburgh.

Gaelic Place-Names Committee.

Owing probably to the war no questions of importance have been submitted to the Committee during the year. They much regret the loss by death of Mr. W. C. Smith, K.C., one of their most zealous members.

The Scottish Geographical Magazine.

The Honorary Editorship.—Dr. John Horne has been elected Honorary Editor of the *Magazine* in succession to the late Professor James Geikie.

The Society's *Magazine* has, as usual, been published throughout the past session monthly, with maps and illustrations.

The Council are glad to acknowledge their obligations to the contributors of articles, and to the following gentlemen who have rendered valuable assistance to the editors:—The Hon. John Abercromby; Dr. J. G. Bartholomew; Dr. R. N. Rudmose Brown; Mr. H. M. Cadell; Dr. R. Campbell; Mr. George G. Chisholm; Mr. James Cossar; Mr. A. L. Cross; Dr. A. S. Cumming; Mr. James Currie; Mr. G. F. Scott Elliot; Dr. J. D. Falconer; the late Mr. H. B. Finlay; Mr. J. Geddie; Prof. J. W. Gregory; Sir Philip Hamilton Grierson; Dr. Cargill Knott, Sec.R.S.E.; Rev. R. Mackenzie; Mr. J. Mathieson; Mr. J. D. Monro; Mr. T. S. Muir; Mr. J. Murray; Mr. Harold Raeburn; Mr. Ralph Richardson; Mr. W. B. Wilson; Lieut.-Col. A. C. Yate.

The Library and Map Department.

During the past session 171 books, 49 pamphlets, 273 reports, 19 atlases, 288 map-sheets and charts have been added to the library. The Transactions and periodicals received regularly number 145. The number of volumes borrowed by members was 2504, and the library was, as usual, much consulted by non-members in search of geographical information.

The Council desire to record their thanks to foreign and colonial governments for the official publications they have presented to the library; to the Treasury, for the revised Ordnance Survey maps of Scotland, both in outline and colour, as each of the revisions now in progress is published; to the Geological Survey of Scotland; to the Geographical Section, General Staff, War Office; to the Admiralty; to the British Museum (Natural History), to the Edinburgh University Library, the Royal Society of Edinburgh, and the Survey of India; and also to the undermentioned private donors of books and maps, viz.:—

Mr. Edwin S. Balch; Dr. J. G. Bartholomew; Dr. W. S. Bruce; Col. F. C. Close; Mr. A. A. Gardner; Mr. J. H. Hyde; Dr. J. Scott Keltie; Dr. T. D. MacDougal; The Hon. Gladys Graham Murray; Mr. Felix Oswald; General J. de Schokalsky; Mr. R. Campbell Thompson; Mr. J. B. Tyrrell; Mr. W. Walker.

Glasgow, Dundee, and Aberdeen Centres.

The Council have again pleasure in acknowledging the services rendered by the honorary officials of the Glasgow, Dundee, and Aberdeen centres for their continued successful conduct of the business of the Society.

Finance.

The Annual Financial Statement here follows.

ABSTRACT OF THE ACCOUNTS OF THE ROYAL SCOTTISH GEOGRAPHICAL SOCIETY

From 1st October 1914 to 30th September 1915.

FUNDS AT THE CLOSE OF LAST ACCOUNT:—			
£1000 Glasgow and South-Western Railway Company 4 per cent. Debenture Stock, at cost price, as at 29th May 1885,		£1102 19 9	
£533, 6s. 8d. North British Railway Company 3 per cent. Consolidated Lien Stock, at cost price, as at 30th December 1890,		496 2 0	
£200 Great Central Railway Company 4½ per cent. Debenture Stock, at cost price, as at 31st December 1898,		312 2 9	
£240 North British Railway Company 4 per cent. Consolidated Preference Stock, No. 1, at cost price, as at 11th December 1902,		306 8 9	
£400 Dominion of Canada 3½ per cent. Registered Stock, 1930-50, at cost price, as at 9th March 1911,		405 1 0	
		£2622 14 3	
BALANCE due by Banks:—			
On Account Current,	£106 11 5		
On Deposit Receipt,	630 5 11		
On Do. do. (Glasgow Equipment Fund)	64 16 9		
Due by Treasurer,	5 8 7		
		807 2 8	
		£3429 16 11	
Less—Subscriptions received in advance:			
Ordinary Members,	£13 2 6		
Associate Members,	1 1 0		
Entrance Fees,	1 10 0		
		15 13 6	
		£3414 3 5	
SUBSCRIPTIONS from Ordinary Members,	£1577 2 0		
Less—Paid in Advance,	8 8 0		
	£1568 14 0		
SUBSCRIPTIONS from Associate Members,	99 15 0		
FEES received for Society's Diploma,	2 2 0		
DIVIDENDS and INTERESTS,	101 4 9		
GOVERNMENT GRANT,	200 0 0		
MISCELLANEOUS,	7 0 3		
ENTRANCE FEES from new Members, £24 3 0			
Less—Paid in Advance, 0 10 6	23 12 6		
		2002 8 6	
		£5416 11 11	

MAGAZINE—Expenses of Publication, etc., for Nos. 10 to 12 of Vol. XXX., and Nos. 1 to 9 of Vol. XXXI.:—			
Printing and other charges,		£617 14 9	
Illustrations,		49 7 11	
Maps,		39 16 6	
		£706 19 2	
Less—Magazines sold,	£61 16 11		
Advertising Receipts, less Payments,	40 18 8		
		102 15 7	
		£604 3 7	
GENERAL PRINTING,		20 11 0	
BOOKS and other furnishings for Library,		74 0 4	
EXPENSES in connection with Lectures—*Less* Lecture Tickets sold,		289 12 9	
GLASGOW BRANCH, Rent of Room,		15 0 0	
RENT OF COUNCIL ROOM, Taxes, Gas, Repairs, Insurance, etc.,		298 0 3	
SALARIES,		573 1 0	
MISCELLANEOUS, including Stationery, General Expenses, and Postages,		97 3 11	
MEDALS,		1 16 6	
		£1973 9 4	
FUNDS AT THE CLOSE OF THIS ACCOUNT:			
£1000 Glasgow and South-Western Railway Company 4 per cent. Debenture Stock, at cost price, as at 29th May 1885,	£1102 19 9		
£533, 6s. 8d. North British Railway Company 3 per cent. Consolidated Lien Stock, at cost price, as at 30th December 1890,	496 2 0		
£200 Great Central Railway Co. 4½ per cent. Debenture Stock, at cost price, as at 31st December 1898,	312 2 9		
£240 North British Railway Company 4 per cent. Consolidated Preference Stock, No. 1, at cost price, as at 11th December 1902,	306 8 9		
£100 Dominion of Canada 3½ per cent. Registered Stock, 1930-50, at cost price, as at 9th March 1911,	405 1 0		
£400 War Loan, 1925/45, purchased 19th July 1915, cost	397 17 3		
	£3020 11 6		
BALANCE due by Banks:—			
On Account Current, £136 13 4			
On Deposit Receipt, 228 16 6			
On do. do. (Glasg. Equipment Fund), 64 16 9			
DUE by Treasurer, 1 3 0			
	431 9 7		
	£3452 1 1		
Less—Subscriptions received in advance:—			
Ordinary Members, £8 8 0			
Entrance Fees, 0 10 6			
	8 18 6		
		3443 2 7	
		£5416 11 11	

Edinburgh, 20th October 1915.—I have examined the Accounts of the Royal Scottish Geographical Society for the year ended 30th September 1915, of which the above is an Abstract, and compared them with the Vouchers and Instructions thereof, and I find the whole to be correctly stated and sufficiently vouched and instructed.

P. C. ROBERTSON, M.A.,

LIVINGSTONE MEDAL FUND.

FUNDS AT THE CLOSE OF LAST ACCOUNT:—

£770 North British Railway Company 4 per cent. Preference Stock, No. 1, at cost price,	£999 11 6	
Deposit Receipts,	66 17 0	
		£1066 8 6

INCOME RECEIVED:—

Dividend on £770 North British Railway Company 4 per cent. Preference Stock, No. 1, for year to 30th June 1915,	£27 15 7	
Bank Interest,	1 12 5	
Income-tax recovered,	2 7 4	
		31 15 4
		£1098 3 10

FUNDS AT THE CLOSE OF THIS ACCOUNT:—

£770 North British Railway Company 4 per cent. Preference Stock, No. 1, at cost price,	£999 11 6	
Deposit Receipts,	98 12 4	
		£1098 3 10

£1098 3 10

Edinburgh, 20th October 1915.—Examined and found correct.

P. C. ROBERTSON, M.A., C.A., Auditor.

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